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Turned and Pierced Potpourri Box

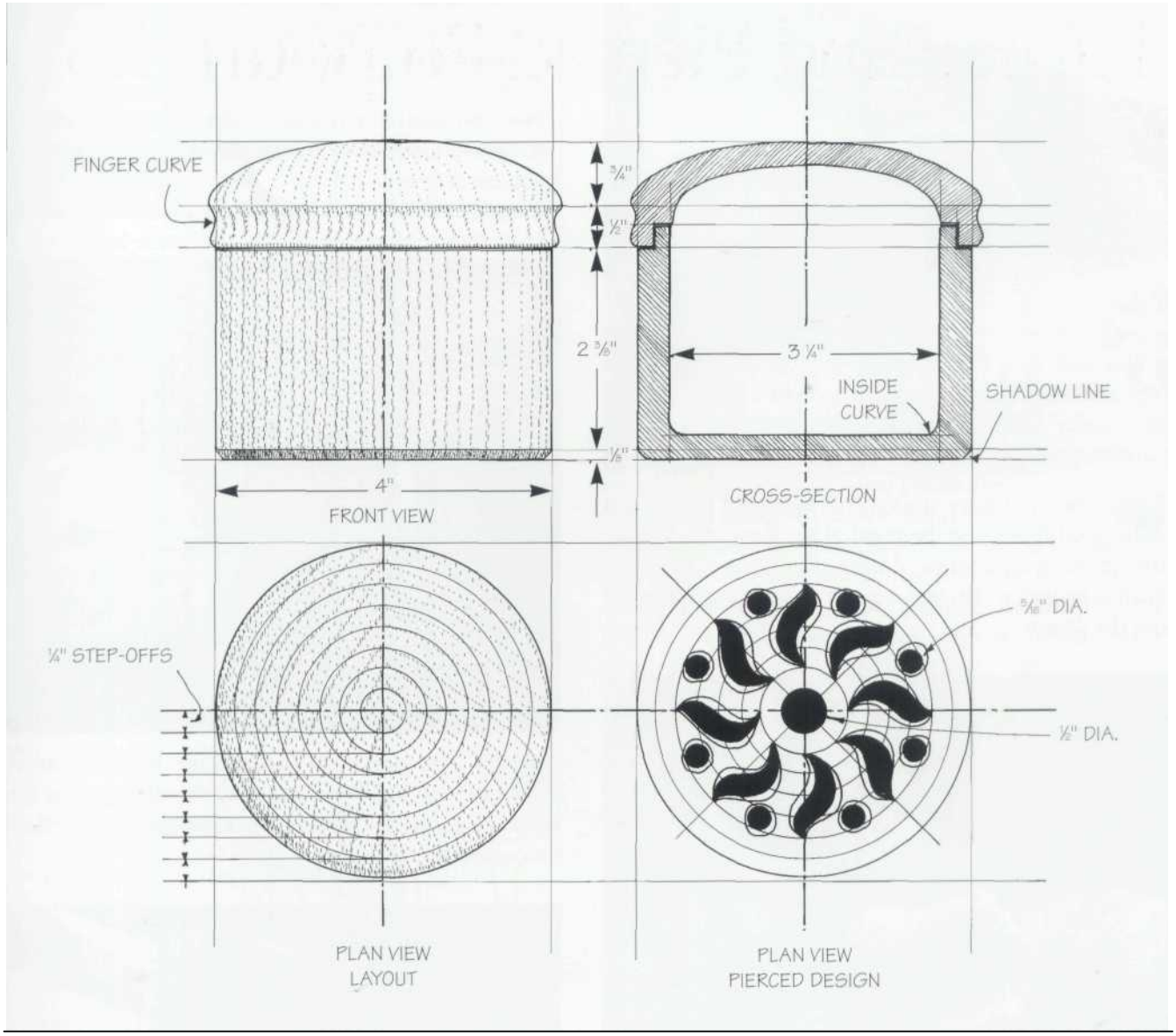
Wood turning, cutting delicate frets with a scroll saw, and whittling are three of my favorite woodworking activities. The problem, when I first started thinking about this project, was how could I incorporate the three techniques to create a single unique item? After a good deal of thought I came up with the notion for this project—a turned box with a pierced lid, with a small amount of knife work in and around the piercing.

The design draws its inspiration from two of my **friends,** one a wood turner and the other a general woodworker. However, they both needed a fresh angle to spark off their talents. Well, to cut a long story short, Gill came up with this great idea that they combine their talents so as to halve their workshop expenses and double their money-making potential. The good news is that they now make the most beautiful turned and pierced containers, and they are both scooping up the rewards!

TURNING THE BOX

Though there are any number of ways of turning a small lidded box of this type and character, the best way is to use the four-jaw chuck technique. The procedure is wonderfully simple and direct. Having mounted the wood in the chuck, you start by turning the wood down to a 4"-diameter cylinder, and parting off the tailstock end of the cylinder for the lid. This done, you hollow turn the box and cut the step on the rim, then take the surface to a good finish and part off.

The next step is perhaps slightly tricky. You remount the lid section on the lathe and start by hollowing out the



lid and cutting the rim to fit the base. Then you remove the lid from the chuck, turn it over so that the expanding jaws of the chuck fit the **inside** of the rim, and finish up by turning the top of the lid. Don't forget to set the **lid** out with the 1/4″ step-off lines to help later when you set **out the** design.

SPECIAL TIP: SCROLL SAW LIMITS

If you like the idea of this project but are planning to change the shape of the turned box, or even change the placing of the pierced holes, be mindful that the overall design is more or less governed by the use of the electric scroll saw. For example: As the saw is unable to cut wood thicker than about ¼ ", the lid can't be high and/or domed. Also, the saw can't be used to fret a pierced design around the box.

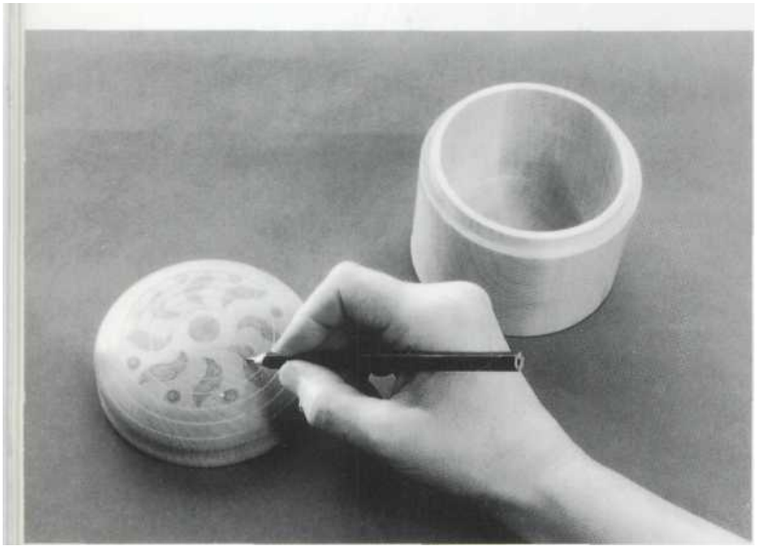
All that said, if you are keen to change the pierced design and/or the shape of the lid, you could possibly use a jeweler's piercing saw or perhaps a fine-blade hand fretsaw. It needs a bit of thinking about.

FRETTING, PIERCING AND WHITTLING THE LID

When you have made the turned box, with the lid nicely set out with the 1/4" guidelines, it's time to fret out the design. Pencil-press transfer the design through **to** the wood, bore out round holes with appropriate size bits, drill small **pilot** holes through the "windows" of the design, and fret out the shapes on the scroll saw. Finally, use the point of the knife to trim back the sharp edges of the piercings.

1 When you have sanded and smoothed the lid to a

good finish, use the point of the skew chisel to set the lid out with a series of rings. Space them about 1/4" apart. The idea is that you can use them as a guide to lay out the design.

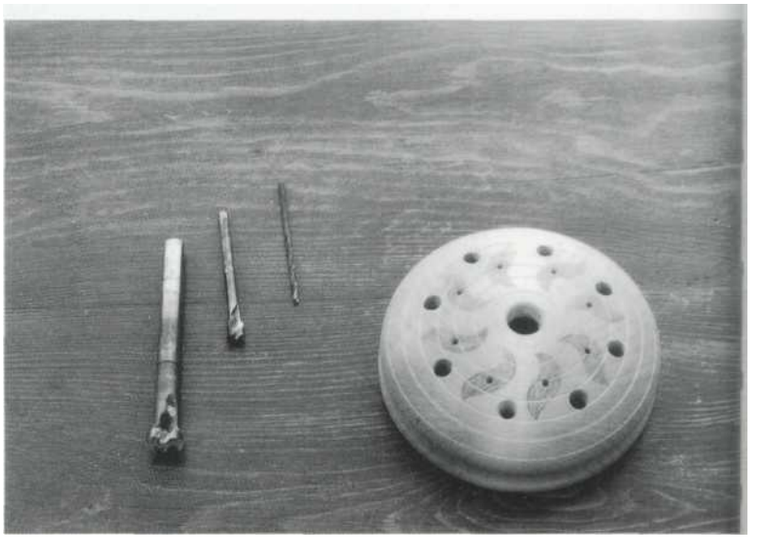


2 Shade in the pierced areas so that there is no doubt about the line of cut. If you are worried about the pencil smudging, then it's a good idea to give the whole lid a quick spray with pencil fixative as used by illustrators.

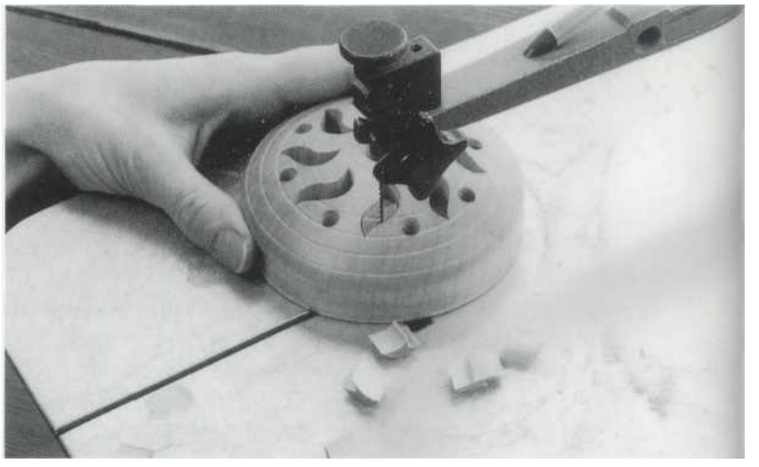
MATERIALS LIST

A Board (1)	4½"×4½"×6"

Note: Because we were a bit short of wood, we decided to laminate two pieces to make the 4½"×4½"×6" section.



3 It's most important that you use Forstner bits for the large holes that make up the design. I say this because they are the only bit types that guarantee **perfect**-every-time holes.



Take two cuts for each end of the little curved shape. Work from the central pilot hole and down toward the point so that the point is crisp and sharp.

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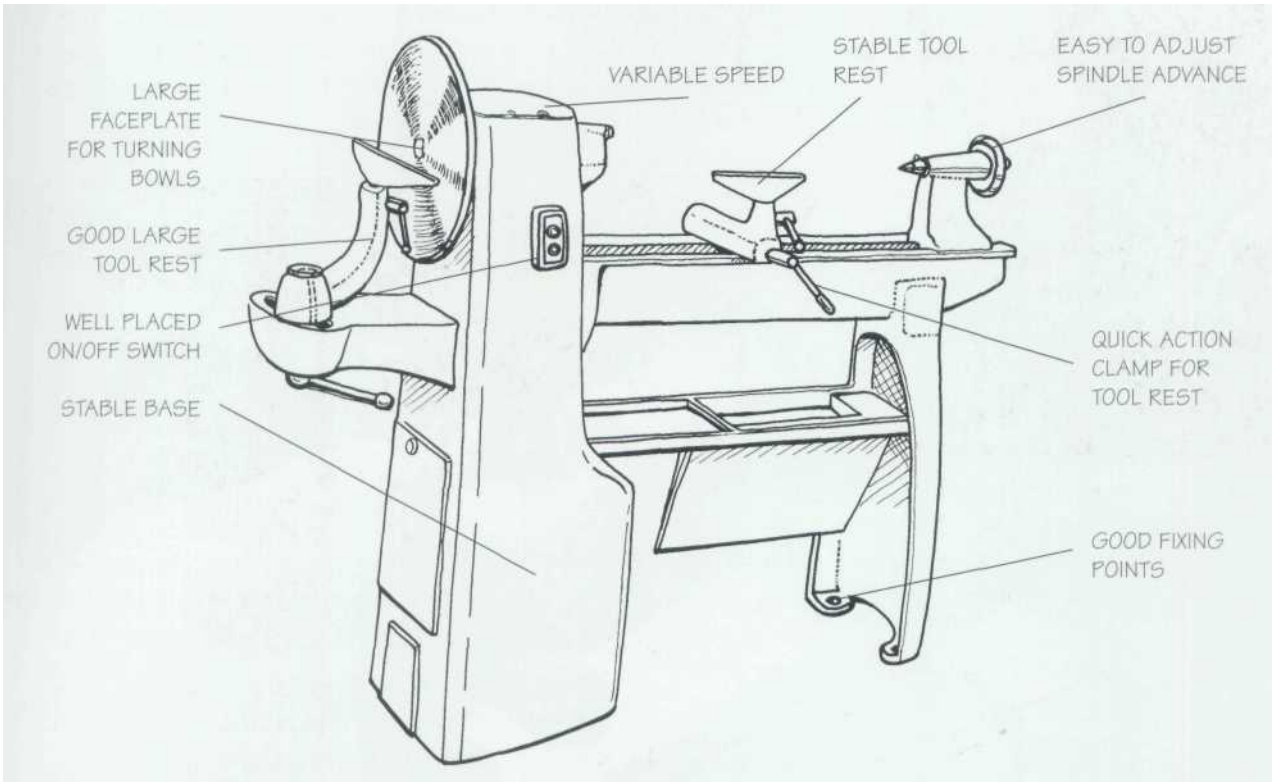
USING THE LATHE AND THE FOUR-JAW CHUCK

Though wood turning is one of the most important wood**working activities**—vital for making just about everything from chair legs, stair balustrades, and bedposts, to boxes, candlesticks and bowls—it is also one of the most misunderstood of all the woodworking techniques. What happens **with** most beginners is that they purchase an "amateur" machine and a set of "starter" tools, and then become disenchanted when they can't make anything more exciting than small spindles. The problem, of course, is that small machines tend to wobble and shake, and the pronged center and the fixed tailstock center that are supplied **with** most small machines are totally inadequate and almost useless. As a result, many beginners soon get disillusioned and decide to give up wood turning. The **pity of** it **is** that the majority of these disillusioned beginners heap blame on themselves. Of course, what these beginners simply can't know is that turning is the one area of woodworking where the old adage "a poor workman always blames his tools" is a load of bunk! In the context of wood turning, the boring old adage ought more rightly read "poor results are nearly *always* the result of poor tools." All this adds up to the inescapable fact that exciting and varied wood turning can only really be achieved if you have top quality tools and equipment.

So there you go. If you are a beginner looking to get started, the following pointers will show you the way.

Lathe

In essence, a lathe is a woodworking machine used for cutting and shaping wood into a round section. The wood is pivoted and spun between centers and/or held **in** a chuck, while at the same time handheld chisels or gouges are used **to** make the cuts. Though there are many lathe types—small ones, large ones, very long ones, some dedicated to making spindles, some dedicated to making bowls, some with fancy multispeed controls, and so on—experience tells me that a large traditional lathe, with a big motor and a heavy cast-iron frame, is by far the best option. I say this because while a miniature lathe might well be superb for making small items like lace bobbins, it can't be used to make larger pieces like bowls and chair legs. A large lathe, on the other hand, can be used to make everything from lace bobbins to bedposts. As for the cast-iron frame of a large lathe, there's no rust, no vibration, no nothing—it just sits there and does the job! I have a large old English lathe called a Harrison Jubilee, made about 1940. It is a wonderful machine.



LATHE ANATOMY

If the notion of wood turning appeals to you, then be sure to invest in the biggest, best quality lathe that you can afford.

HEADSTOCK AND *TAILSTOCK*

The headstock, the power-driven unit at the left-hand side of the lathe, carries the bearings in which the spindle revolves. The spindle has an external screw for chucks and **faceplates** and an internal taper for the pronged center. The tailstock, the movable unit at the right-hand side of the lathe, holds a pointed center. The distance between **the** headstock and the tailstock can be adjusted by winding the tailstock center in or out.

TOOL *REST*

The tool rest, sometimes called T-rest, is the unit that moves left or right along the bed on which the tools—meaning the gouges and chisels—are rested. Being mindful that the rest is a fulcrum for the levering action of the tools, it is essential that it can be swiftly and easily moved and put in place.

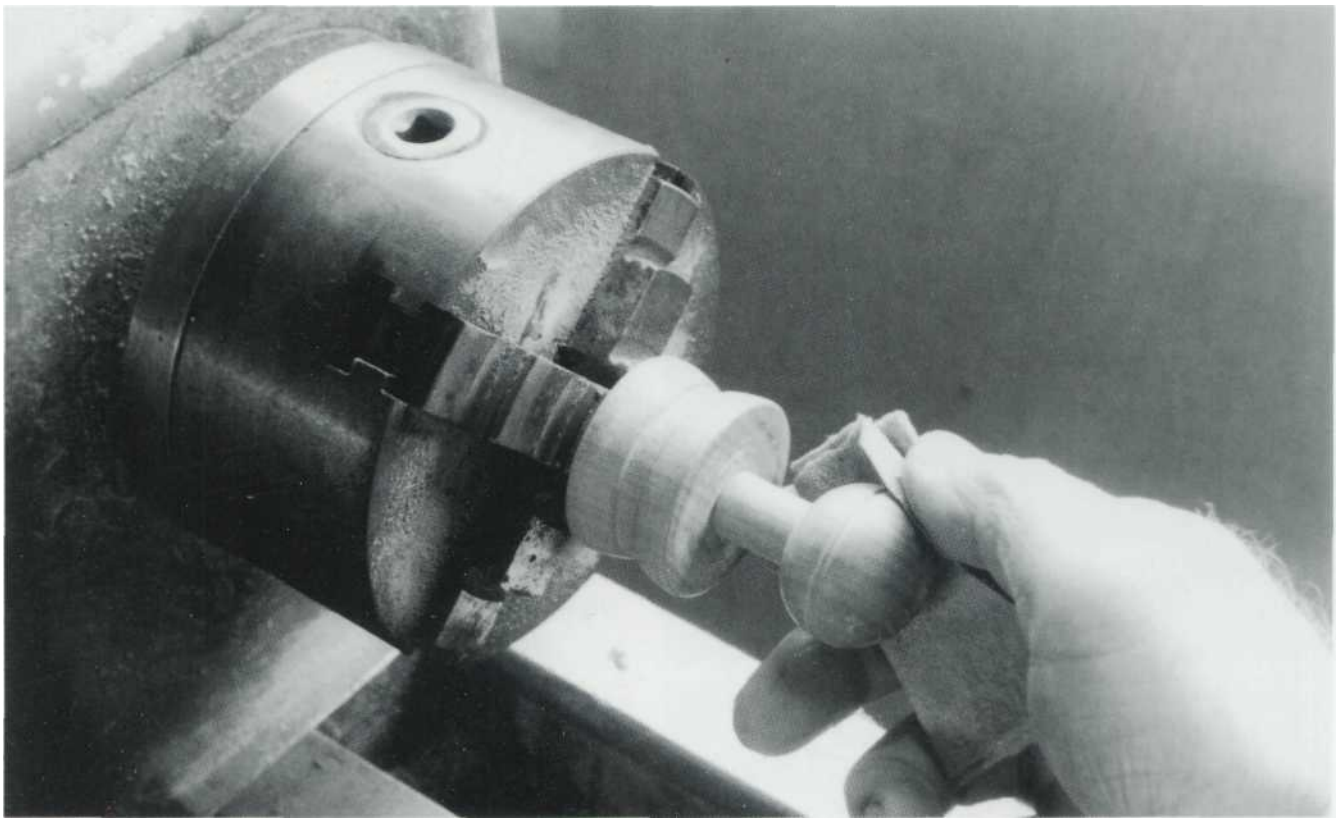
THE BED

The bed is the metal track, rods or rails that link the headstock to the tailstock, upon which the tool rest slides. Since it is vital that you are able to swiftly and easily move the tool rest, it is best to avoid narrow-slot, round-section bar beds that easily get clogged up with dust and shavings.

Four-Jaw Chuck

The four-jaw chuck is a mechanism used to hold the workpiece; it is a device that replaces the pronged center and all manner of other centers. Operated by a chuck key, the four jaws can be opened and closed in unison in such a way that they grip square sections. To my way of thinking the four-jaw chuck is essential. Okay, so four-jaw chucks are expensive—mine cost one-quarter the price of my secondhand lathe—and they do need to be fitted with a guard. But they grip wood without the need to turn it down to a round section—a huge time-saver—and once the wood is in the chuck, you can be confident that it's going to stay put.

When I said at the beginning that you can make just about everything you care to imagine on a large lathe, I should really have added the proviso: but only if you use a four-jaw chuck. You should see me at my lathe. 1 don't mess around with pronged centers or faceplates. 1 threw them away long since. I simply mount everything on the four-jaw chuck and get straight into the job. As well as holding square sections without the need for preparation, the jaws are good for other uses, such as holding rings and containers, holding a large screw—instead of using a screw center—and gripping round sections.



FOUR-JAW CHUCK

The ***advantage*** of *the four-jaw chuck is that you can draw the tailstock center out of the way and approach the workpiece head-on.*

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Heart-Shaped Cheese Board

This project had its beginnings in our ever-pressing need to tidy up our workshop. The problem was, of course, what to do with the mountain of offcuts? I'm sure you know what I mean. The chair, table, box or whatever is finished, and you are left with great heaps of wood. Okay, maybe the longer lengths can be used for the next **job** in line, and the shavings can be used as fuel or as bedding for your chickens, and the dust can be swept up and put in the trash, but what to do with the medium-size bits and pieces that look too good to throw away? Well, after a deal of thought, we came up with the super-brilliant idea of cutting all our small offcuts down to a uniform size, and then laminating the resultant blocks to make cutting boards and surfaces that needed to show end grain. Okay, so it is a solution that involves a l**ot** of time, sweat and effort, but then again, the finished boards can be presented or marketed as choice handcrafted items.

So there you go. If you are up to your knees in offcuts, or you are short of cash and maybe know of a sawmill operator who is looking to give away his trimmings free, then perhaps this is the project for you!

MAKING THE BOARD

Collect all your waste wood and cut it down to the best overall section size. I went for a square section 1 3/4" X 1 3/4", but you can just as well go for 1" X 1" or 1" X 1 1/2"**,** or whatever size best suits your material. And, of course, if **you** want to use a mix of sizes, then no matter, as long as the grain is running along the length and the corners are true at 90°. Having achieved your sawed size, plane the wood down to a smooth finish. When you are happy with the finish, saw it down to 1 1/8" slices. When you have a stockpile of 1 1/8" slices, pencil label the end-grain face, arrange the slices side by side in rows of about 12" long, and spend time working out how best to clamp them together. You can use a couple of G-clamps and a bar clamp, or a jig and wedges; no matter, as long as the arrangement is such that you can apply end pressure without the strips bending or bowing along their length.

Do the gluing-up in two stages: first the blocks side by side **to** make the strips, and then the strips side by side **to** make the slabs. Draw the design of the board on the slab, cut out the profile and sand the end-grain surfaces to a good finish. Fit the whittled feet and the cutting wire, give the whole works a coat of matte varnish and the **project** is finished.

SPECIAL TIP: DRY FIT FIRST

As the success of this project hinges on your being able to glue and clamp dozens of the little blocks together, it is important that you plan out the procedure. The best way is to have a trial dry run, with everything in place except the glue. You need to check out the glue type and make sure that it's suitable, clear an area and make sure that there is room to maneuver, have cloths and newspaper handy, and so on. And then you have to actually clamp-up the wood and see how your arrangement works out. Okay, so maybe my way of working does sound a bit fussy, but the horrible alternative is to have glue smeared all over the place, only to find that the clamp isn't long enough, or you have glued the wrong surfaces, or you are missing some vital piece of equipment.

MATERIALS LIST

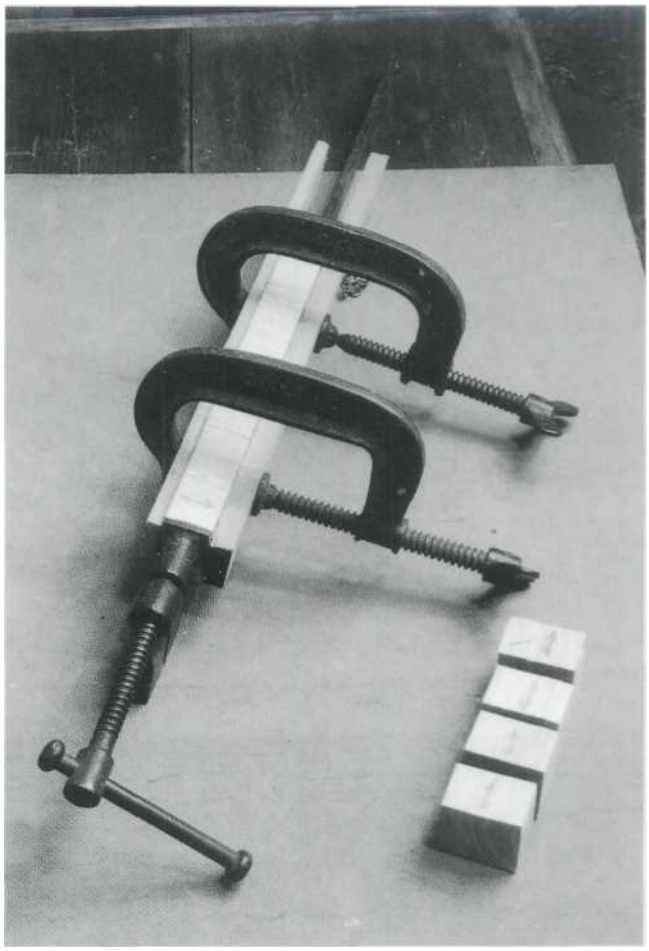
A Board	1¾″×1¾″ offcuts—enough to suit the size of your board
B Feet (1)	1½″×½″×6″
	½″ dowel × 4″ long
C Toggle handle (1)	fancy hardwood ½″×1″×4″

HARDWARE AND EXTRAS

D Cheese wire (1)	15″ long

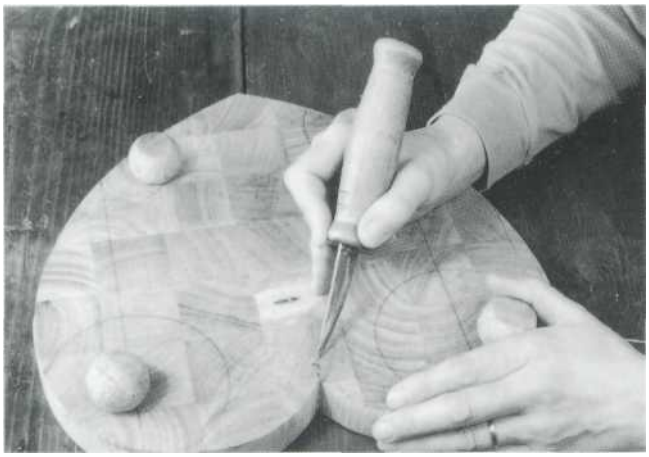
Note that all measurements allow for a small amount of cutting waste.

STEP-BY-STEP **STAGES**

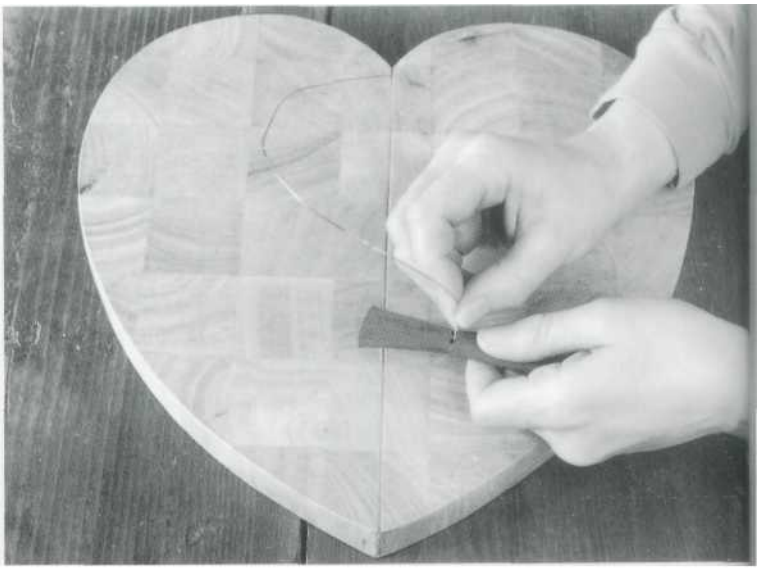


Saw the 1 3/4" X 1 3/4" square section of wooddown into 1 1/8"" thick slices—like slices off a loaf of bread—and then clamp up. With the arrows indicating the run of the grain, you can see how the slices of wood need to be realigned when it comes to gluing.

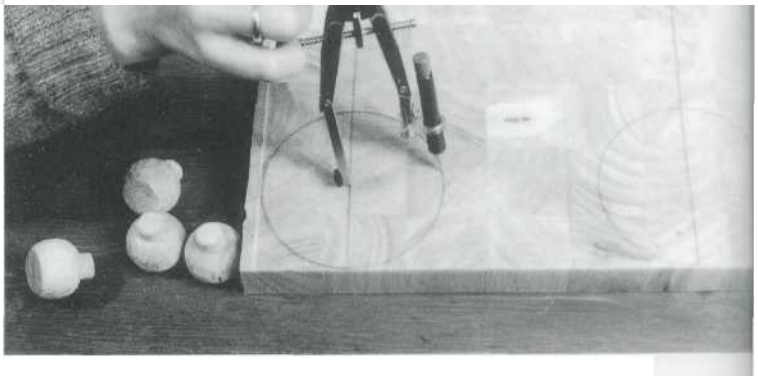
The best way of ensuring that the little ball feet stay in keeping with the total design is to whittle them to shape. I drilled and doweled four little square blocks, cut the corners off the blocks to make rough octagonals, and used a largish sloyd knife for the whittling.



3 To fix the wire, drill a 1/8"-diameter hole, set the wire in the hole and then follow it up with a glued dowel. Make a saw cut between the cheeks, wrap the wire over and around in the cut and follow it up with a glued sliver wedge.



Having whittled a small piece of hardwood to a but terfly shape and sanded it to a super smooth finish run two side-by-side 1/16"-diameter holes through the center of the bow, and knot the wire in place.



And just in case you have an aversion to heart shapes, there is no reason at all why you can't go for just about any shape that takes your fancy. For example, you can simply round the corners of a rectangular board.

DEBRIS COLLECTION AND WOODSHOP SAFETY

Woodshop debris, in the form of offcuts, shavings and sawdust scattered around on the floor and over the surfaces, is a dangerous nuisance. The shavings make the floor slippery and the loose offcuts are potential ankle-breakers. And of course, the wood dust not only clogs the machines, it is a fire risk, it creeps into the home, and it also harms the lungs.

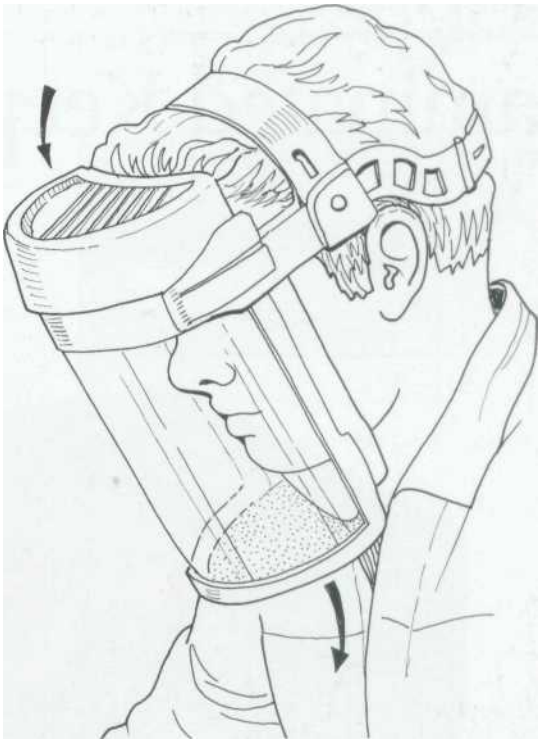
Just how much dust is considered to be dangerous? The Occupational Safety and Health Administration **(OSHA)** suggests that if you can see wood dust floating around in the atmosphere when a shaft of sunlight shines across the workshop, then you have a problem that needs solving.

We tackle the problem in several ways: We cut the amount of dust down at the source by using filtered machines and by producing shavings rather than dust, and we have a large mobile vacuum system that we move around to service the various machines. We also wear a rubber dust/vapor mask for most tasks—like sawing, drilling, and when we are using varnish and such—and a lull-face electric visor-helmet respirator when we are working at the lathe. As to which mask does the better job, the rubber mask is silent but uncomfortable and sweaty, while the electric full-face respirator is a bit heavy and noisy.

In the context of sawdust being bad for your lungs, I reckon that tried-and-trusted traditional American and European woods like ash, oak, beech, maple, willow, pear and pine are generally much safer than exotic species such as mahogany, obeche and iroko. All that said, if you find yourself sneezing, or your nose is running, or your skin develops a rash, then you best go for another wood type.

So what to do if you are really worried about dust and allergic reactions and such? Well, I think that for safety's sake, you need to stay with the following rules of thumb:

- Whenever possible use hand tool techniques that pro duce shavings rather than dust.
- Use traditional white-wood species that are non-oily to the touch.
- Use a vacuum machine to suck up the dust as it is produced—before it gets a chance to puff around the workshop.
- Wear a full-face mask, and always wash your hands and lace alter work.
- Always have a thorough sweep-up at the end of the day.
- If you have a health problem, then ask the advice of your doctor.



ELECTRIC VISOR-HELMET RESPIRATOR

*Though the choice of mask does in many ways depend upon your personal preference—they both have **their plus** points—/ usually wear the full-face respirator when I am working at the lathe, for the plain, simple reason that the **full-face** visor offers additional protection from flying debris.*

Laminated Keepsake Box

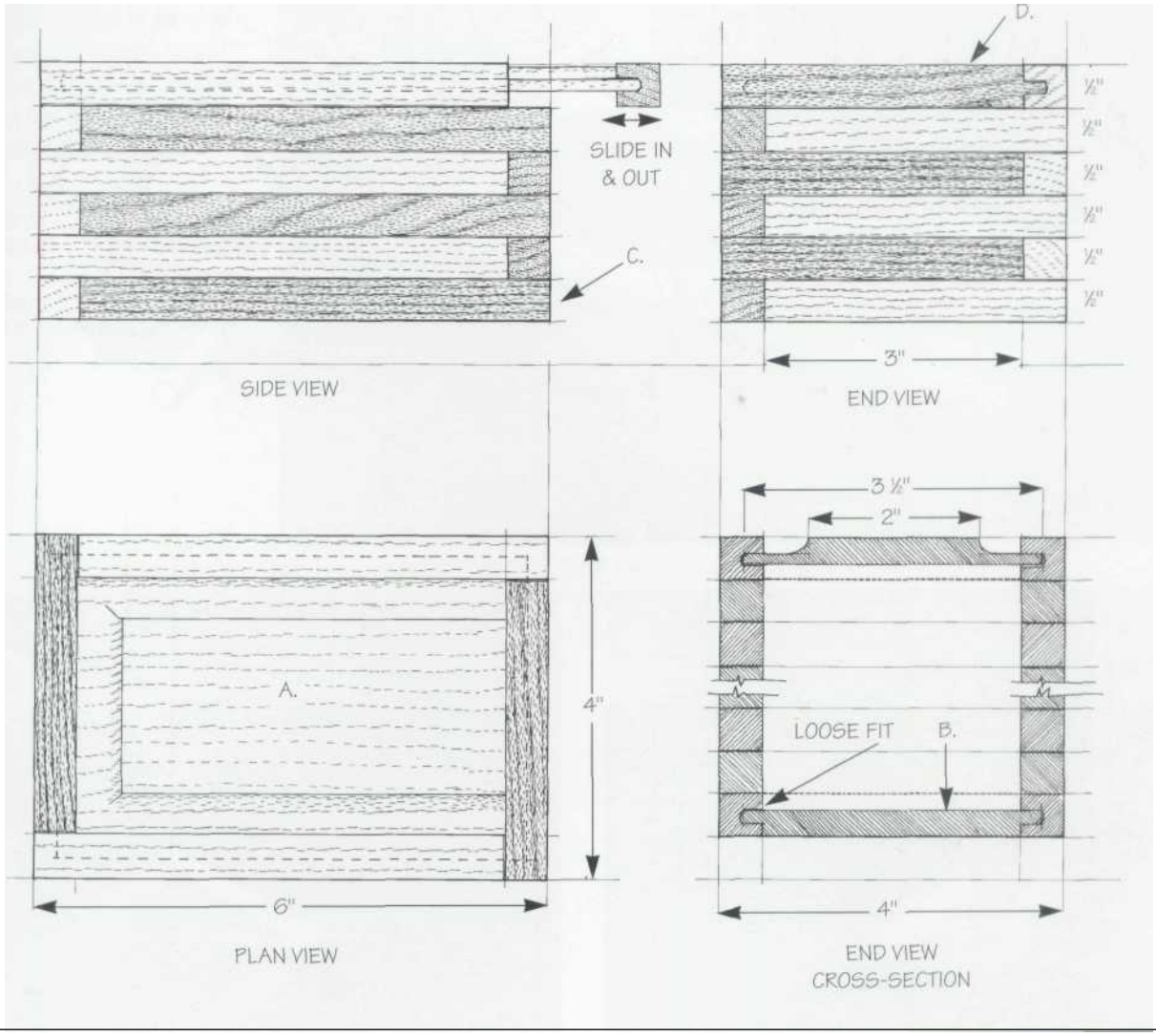
Though you might think that a box is a box is a box and not very exciting, this particular little box is rather special. Not only does it use wood that might otherwise be thrown away, but better yet, the layering technique allows you to very easily modify the length, width and height to suit your own needs. You could call it a "log cabin" box. This refers to the way the sections are layered one on top of another with the ends staggered, just the way the old timers built their log cabins.

MAKING THE BOX

When you have studied the working drawings and seen how the lid and the base boards are set into slots—with the lid being able to slide in and out—then make decisions as to the size of your box, and size and plane the wood accordingly.

If you are going to stay with our design, you need twenty-four 1/2" X 1/2"-square sections in all, twelve long and twelve short. All I did was search through my pile of offcuts, select two colors that went together to make a pleasant counterchange, and then pushed the wood through my portable surface planer. Having planed the wood to a crisp 1/2" X 1/2"-square section, cut the wood to length so that it is perfectly square-ended and slightly oversize. As the long pieces need to end up at 5 1/2"— meaning when they are built into the finished 6"-long box—it's best to cut them at about *5 5/8"*, so you can plane and sand them back to a good fit and finish.

When you have made the twenty-four lengths, pile them up in a dry-run arrangement, in the order they are going to be in the finished box, and pencil mark the top and bottom layers of the stack. Draw in registration marks



so there is no doubting the layered order.

Being very careful that you don't make a mistake, take the eight lengths that go to make the top and the bottom layers and use either a router or a grooving plane to cut the channels. Aim to have the grooves at about 3/16″ wide, 1/4" deep, and centered in the 1/2″ thickness of the wood.

With the channels crisply worked, take the wood that you have chosen for the base and the lid and use a router or a plane to cut the rabbeted edges. While you are at it, use a router or a "round" moulding plane, or even a gouge, to cut the beautiful scooped convex curve that runs down from the top face of the lid through to the rabbet.

Starting at the base and working up, glue the four base lengths together so that the base board is nicely contained, and then layer up in log cabin fashion until the box is complete. Don't forget to leave one of the top-end pieces unglued. This done, test to make sure that the lid is a good fit and leave the box until the glue is set. Glue the short length on the end of the lid board.

Finally, plane and sand the box down to a flush-sided smooth finish, make sure that the lid is a nice easy fit in the grooves, and then wax and burnish to a high sheen.

MATERIALS LIST

A Lid (1)	⅜″×3½″×5½″
B Base (1)	⅜″×3½″×5½″
C Long lengths (12)	½″×½″×5⅜″
D Short lengths (12)	½″×½″×3⅜″

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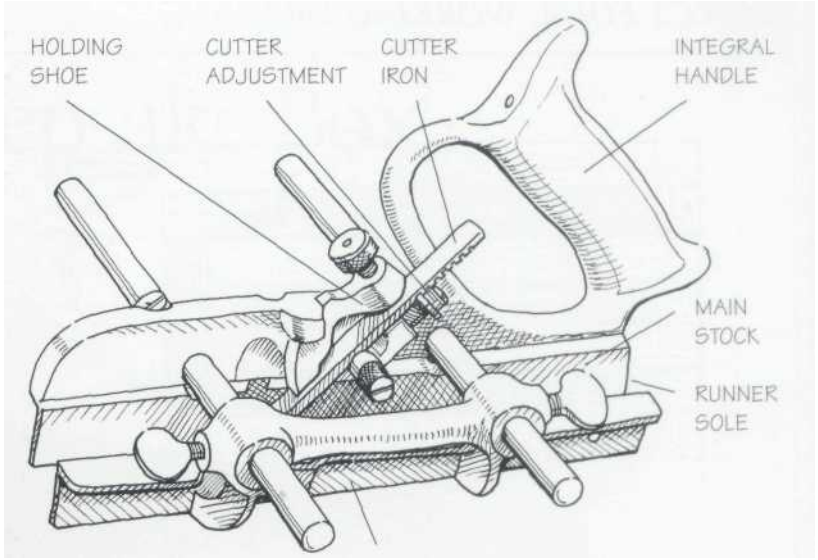
SPECIAL TIP: USING OLD PLANES

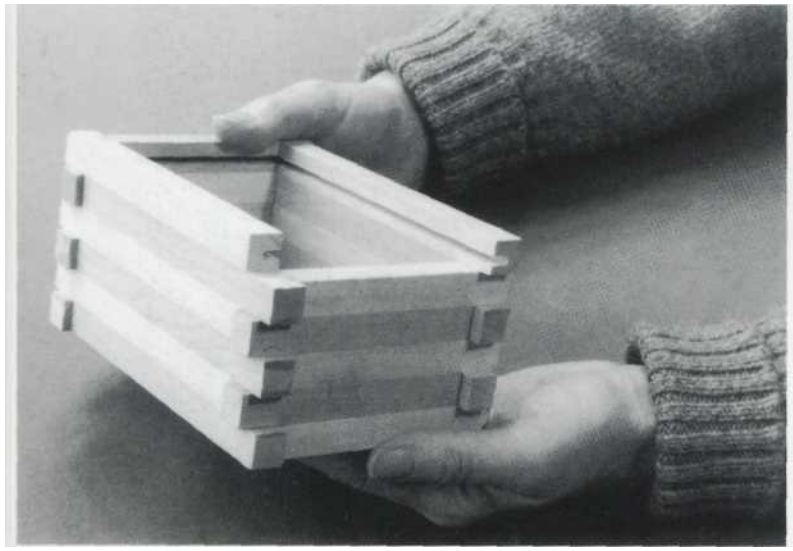
Though there are any number of ways of cutting tongues, grooves and rabbets, I think that the old metal grooving plane takes a bit of beating, meaning one of the old metal Stanley or Record planes. 1 use a Record 043 and 044, both made sometime before 1950. It's true they are no longer made, but 1 picked mine up at a flea market for no more than the cost of a new router bit. The Record 044 has eight blades that range in size from 1/8″ to 9/16".



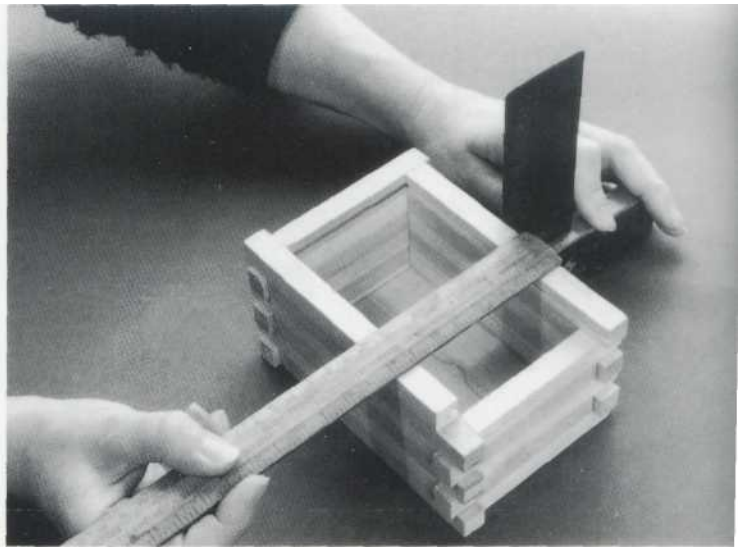
USING OLD PLANES

The classic *Record* 044 grooving *plane is a beauty, easy to tune and pretty foolproof to use.*

STEP-BY-STEP STAGES



1 With the base dry fitted in place—meaning no glue—layer the square sections up log-cabin style so that the ends stick out beyond the corners. Pay particular attention to the alignment of the grooves.



2 When you are happy with the overall shape and alignment of the box, use a ruler and square to check for squareness.

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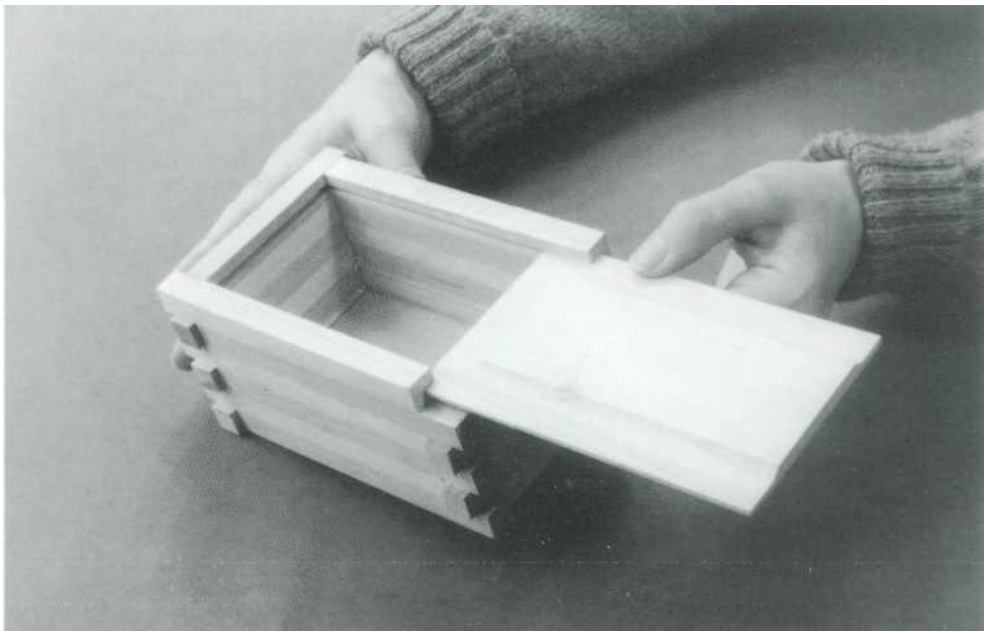
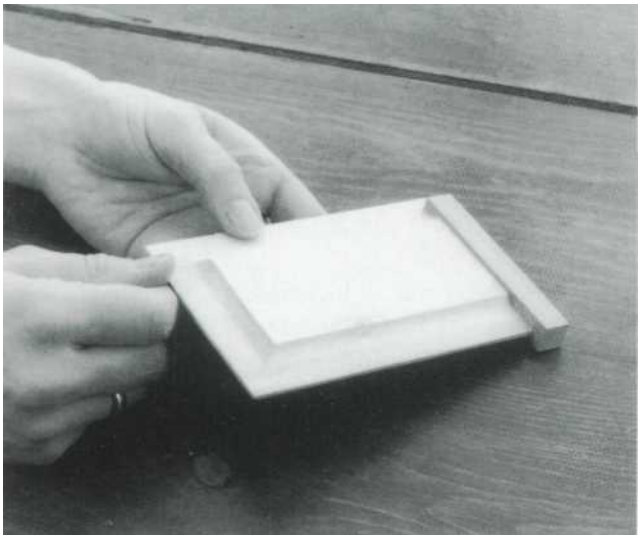
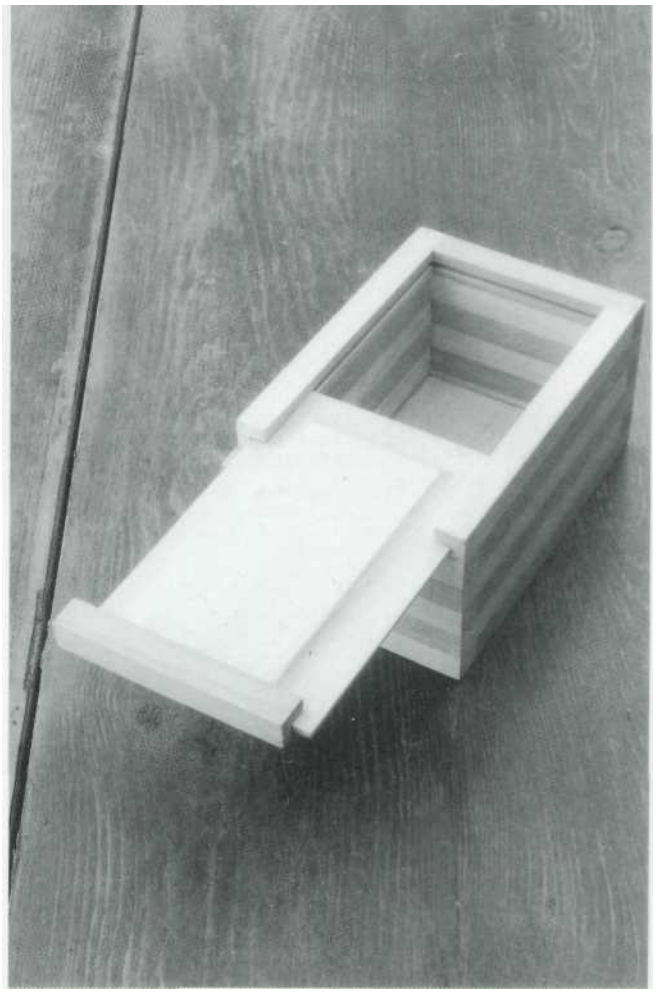
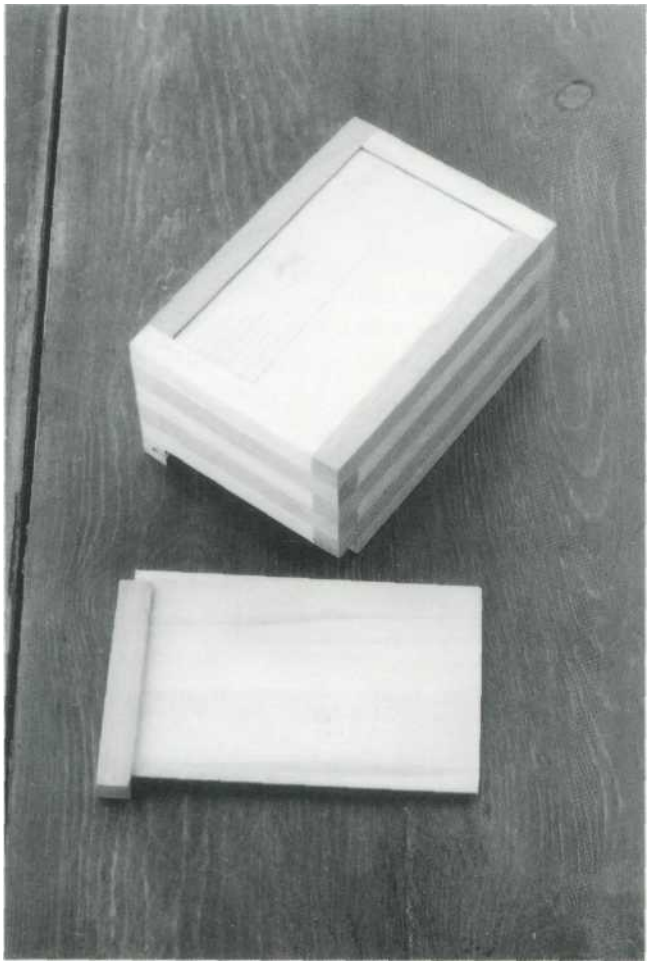
3 Before you leave the glue to set, make sure that the lid is an easy but snug fit and that it runs right through to the end of the box, so that the end runs into the groove.

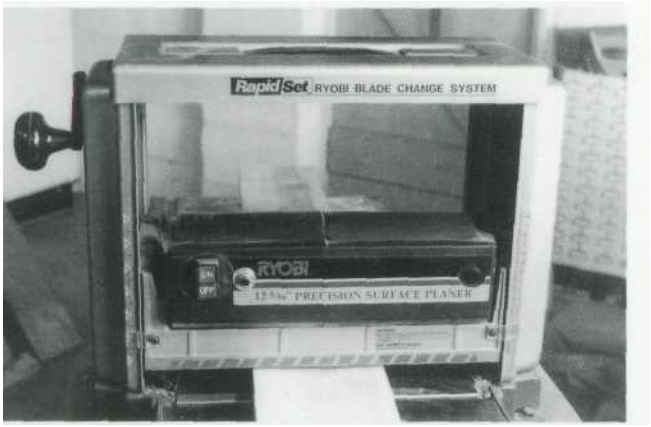








6 If all is correct, the base slab should be well con-unncd, but should fit loosely, so that the box side can move without splitting the base.



The portable surface planer is a great bench machine. All you *do* is *feed the wood in one side, between the cutter blades and the bed, and it comes out* ***the*** *other side nearly finished!*

PORTABLE SURFACE PLANER VS. HAND PLANES

If you are a beginner to woodworking, then sooner or later you will have to make decisions about your overall approach to the subject, or your "working philosophy." One of the main questions that you have to ask **yourself** is, do you want the emphasis to be on the bench power tools—meaning routers, press drills, planers and all **the** rest—or do you want to focus on using hand tools? Most woodworkers 1 know fit in one of four groups:

- Will not use power tools at any price.
- Will grudgingly use the occasional power tool, but much prefers hand tools.
- Enjoys using power tools for most of the work, and tidies up with the hand tools.
- Very much enjoys using power tools and is reluctant to use hand tools.

I reckon that Gill and 1 fit into group two. We much prefer working with hand tools but will sometimes use a power tool to speed things up.

Okay, so you must surely have gathered by now, that we're not very keen on power **tools.** It's not so much that we can't afford to power up, but rather that we both dislike all the dust, debris and noise that power tools generate. To our way of thinking, there is nothing quite so unpleasant as being covered with fine dust and blasted with noise.

All that said, 1 was so tuckered out one day last summer—when I was heavily involved in the strenuous and sweat-making procedure of hand planing a massive rough-sawn oak plank—that I decided, against my better judgment, to invest in a portable planer thicknesser. To cut a long story short—or you could say to plane a fat story thinner (ha!)—when I first saw this machine, I was firmly convinced that it was the beginning of the end of my way of working. My thinking was that it would somehow or other weaken my belief that slow-and-quiet is beautiful. However, there is no denying that it has changed the way 1 work. For example, where I once struggled and strained with a jointer plane, and then a smoothing plane, 1 now pass the wood a few times through the surface planer. In fact, I have to admit that it's a beautifully efficient machine that gets a lot of use. Of course, it is noisy, and 1 do have to house it in its own shed, and I did have to get myself a dust sucker and a full-face respirator mask, but against that, I can now spend much more time playing around with my various grooving, moulding and combination hand planes.

Most experts would agree that the best way is to start with hand tool techniques and then power up when you fully understand your needs.

Miniature Mantle Clock

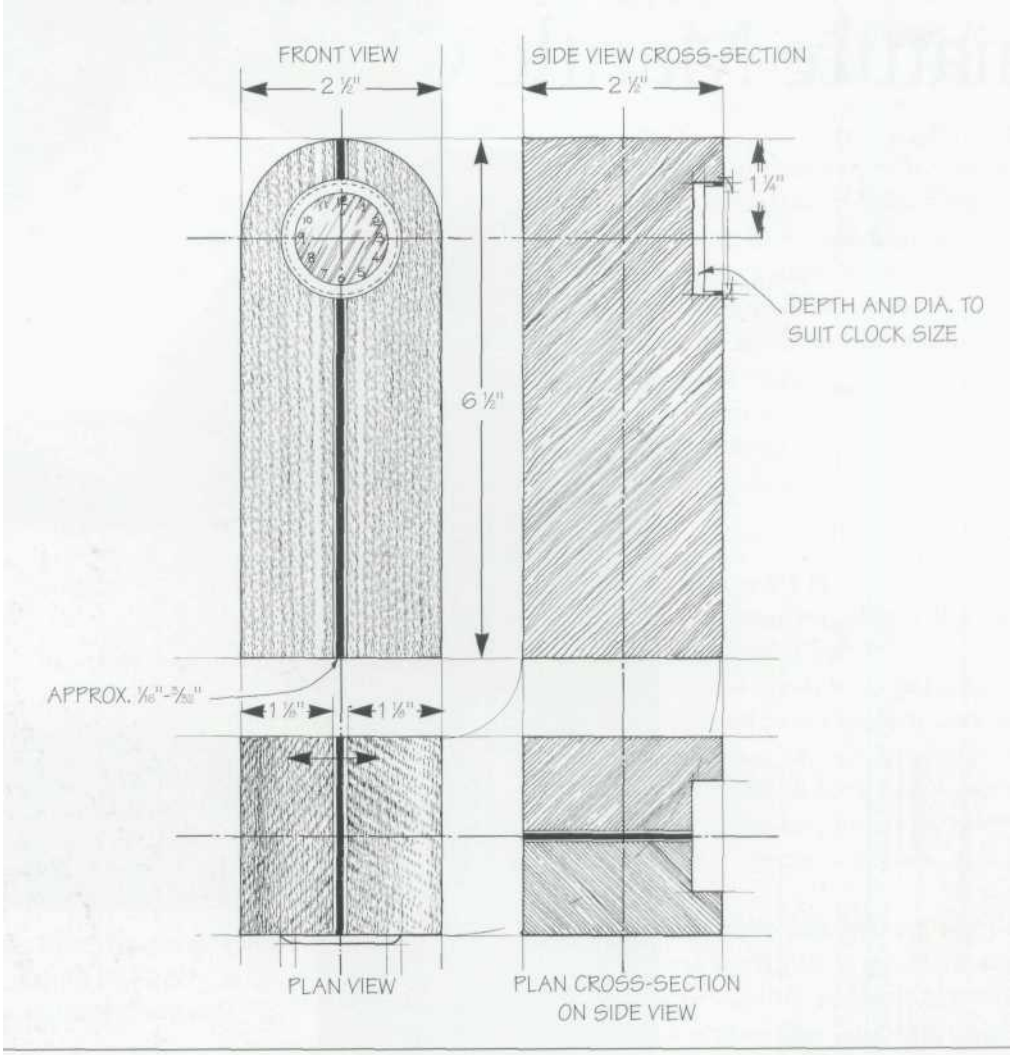
Sometimes, when I am sitting alone in my workshop, I take up one or more pieces of choice wood and feast my eyes on the various colors that make up the character of the grain. To hold the wood up to the light and see the way the grain shimmers and glows, to see how two pieces of wood look when they are held side by side—and then to imagine how the wood might be used for a special project—these are unique quality-time experiences that should not be missed.

This project draws its inspiration from one of my alone - in the workshop musings. The problem was how to bring together three relatively small pieces of choice exotic wood—a scrap of ebony salvaged from an old long-gone piece of furniture, a sliver of silver sycamore veneer left over from a marquetry project, and a short length of dark wood that I've been using to prop open the door. Anyway, I tossed all sorts of ideas around in my head—a small piece of laminated jewelry? a turning? a handle for a knife? a drawer pull? And then it came to me . . . why not make a small clock case!

MAKING THE CLOCK CASE

First things first. Before you do anything else, you need to search out a miniature watch-clock and a Forstner drill bit sized to fit. For example, as my clock (described in the catalog as a "watch-clock miniature suitable for block and drilled recess mounting") measures slightly under 1 5/16" diameter across the span of the back and about 1/4" in depth, I reckoned that I needed a drill size of 1 3/8".

When you have obtained the clock-watch and the drill size to suit, take your chosen pieces of wood and plane and sand the mating faces down to a true finish. This



done, smear white PVA glue on the mating faces and clamp up.

Having waited for the glue to cure, set the compass to a radius of 1 1/4", spike it on the center veneer at a point about 1 3/8" down from top-center, and then strike off a 2 1/2"-diameter half-circle. When you are happy with the way the lines of the design are set out on the wood, move to the band saw and cut out the curve that makes the top of the case.

Use a square to mark out the baseline, double-check that it is absolutely true, and then cut off the waste with a small-toothed backsaw. It's important that the baseline is square to the center line of the block, so spend time getting it right.

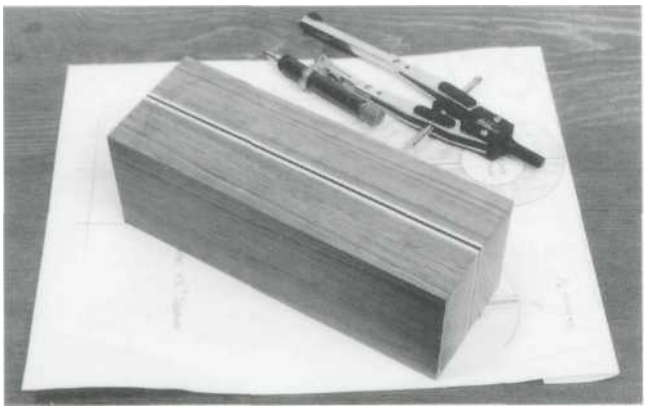
When you are sure that the block sits square and true, move to the drill press and bore out the recess for the clock. Bore down to a depth of about 3/8".

Having bored out the recess, take a scrap of sandpaper and rub down the inside of the recess, so that the clock-watch is a tight push fit. If necessary, use a straight gouge to cut a little scoop for the hand-setting knob that sticks out at the side of clock case. When you have achieved a good fit of the clock-watch in the recess, rub the whole block down on a sheet of fine-grade abrasive paper. Finally, burnish the block with beeswax, slide the clock-watch mechanism in place, and the project is finished.

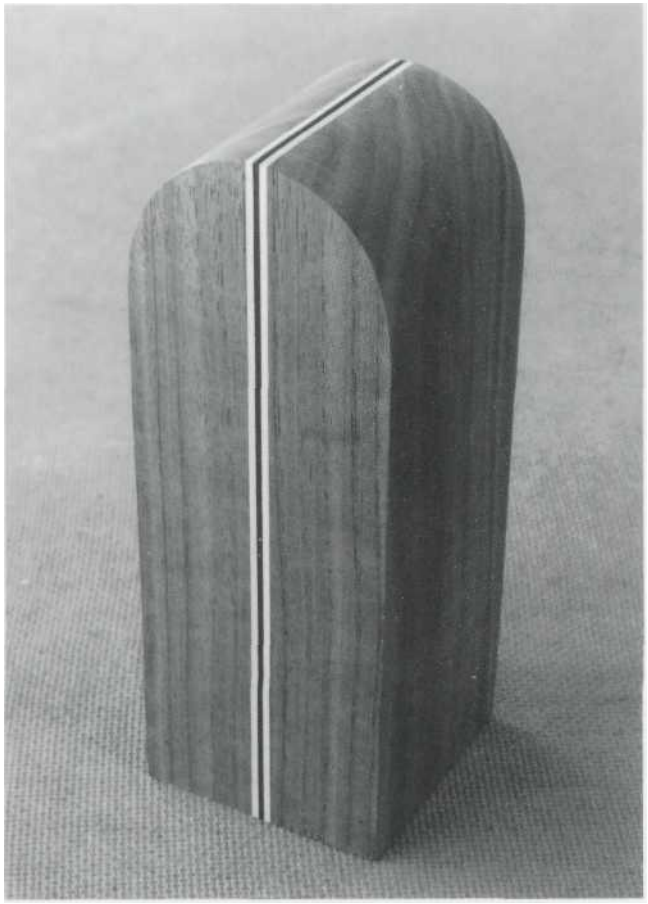
SPECIAL TIP: LAPPING

The best way of rubbing the faces of the block down to a smooth, true finish is to use a technique known as lapping. All you do is mount a sheet of medium-grade abrasive paper to a slab of 1/2"-thick plywood so that the grit side is uppermost. Then clamp the slab in place on the bench, In use, the workpiece is rubbed in the direction of the grain, backwards and forwards. The procedure is rerun with finer and finer grades of paper.

STEP-BY-STEP STAGES



1. pass radius to 1 1/4″ and strike off the arc that makes the top of the case. Make sure that you spike the compass point on the middle of the fine black laminate.



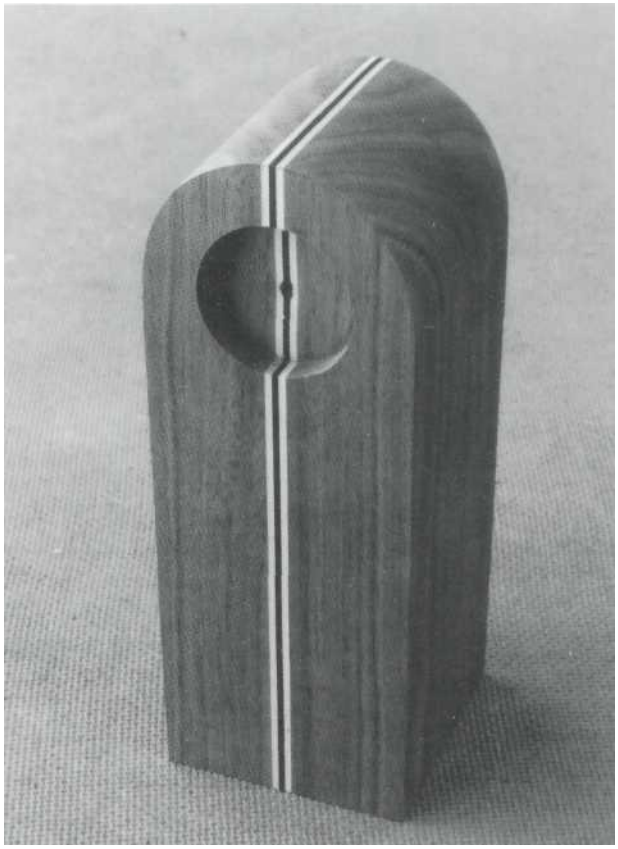
2. laving cut the curve on the band saw, run the faces of the block down on a series of lapping boards. Work through the grit sizes, from a medium-fine through a super-line flour grade. Only work in the direction of the grain, and be careful that you don't blur the sharp corners.

MATERIALS LIST

A Outer faces (2)	1⅛″×2½″×7″
B Central lamination (1)	1/16″-3/32″×2½″×7″
C Side-of-center laminations (2)	1/16″-3/16″×2½″×7″

HARDWARE AND EXTRAS

D Quartz clock-watch, 1 5/16″ diameter—best if it has a push-fit rubber band friction fitting



3. Having selected a Forstner bit sized to fit the diameter of your clock, sink a recess to the appropriate depth. The success of the project hinges on the hole being perfectly placed, so spend time getting it right.

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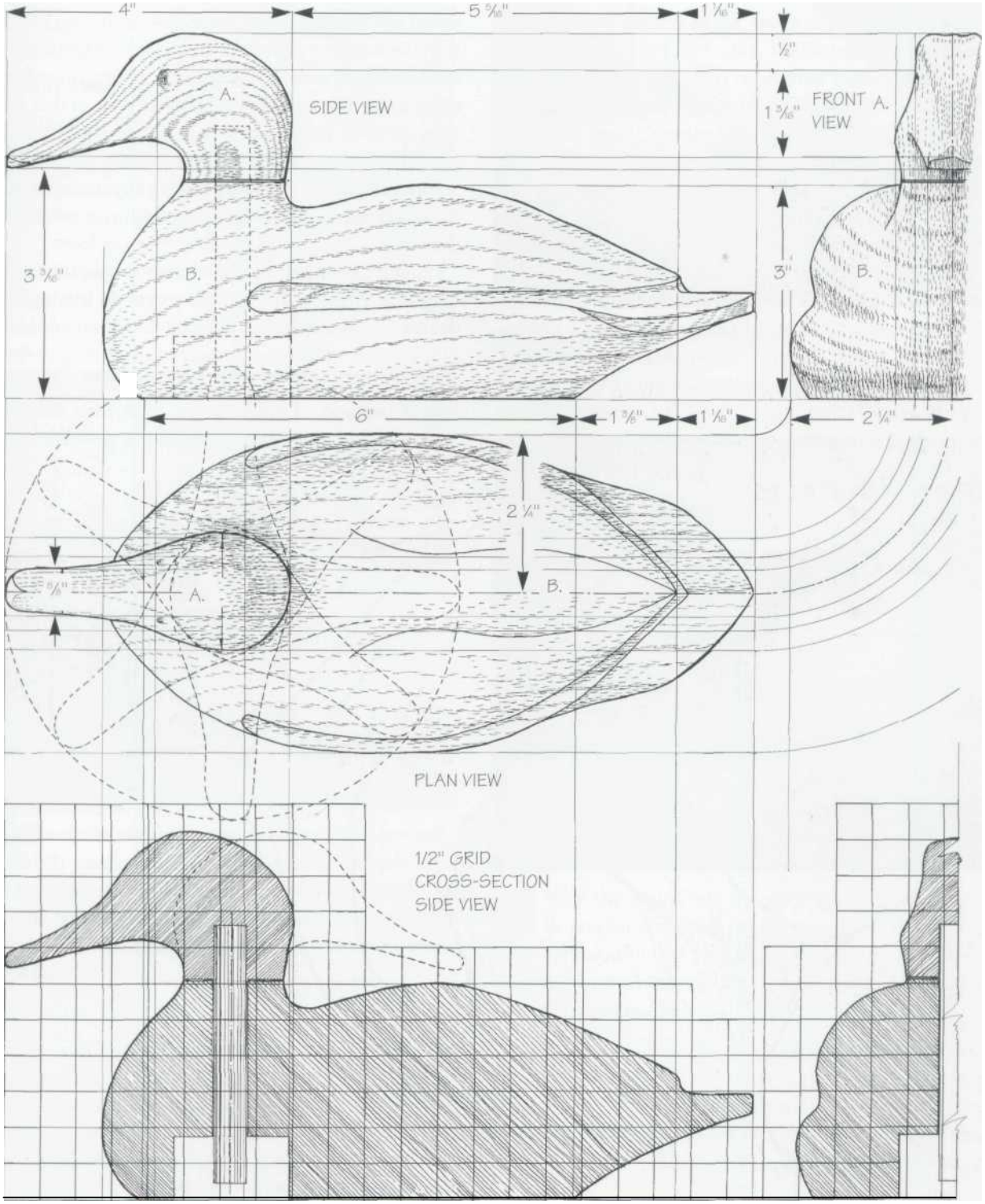
Swivel-Head Duck Decoy

Duck decoys are no more than carved and whittled imitations of the real thing. The word *decoy* comes from the Dutch words *kooj* and *koye* meaning to lure or entice. Though old accounts suggest that decoys were first used by Native Americans, the notion was soon taken up by the white American settlers. It's a wonderfully simple idea: The carved wooden ducks are anchored out in the water, along comes a flock of ducks attracted by the decoys, they circle with a view to settling down on the water, and—Bang!—the hunter is provided with easy targets. Okay, so it's not very sporting, but when one must. . . . Though once upon a time duck decoys were swiftly carved and whittled by the hunters to their own design and then thrown in a corner for next season, they are now considered to be extremely valuable and very collectible examples of American folk art.

MAKING THE DUCK

Having first studied the working drawings, and variously looked at pictures of ducks, collected magazine clippings, made sketches and drawings, and maybe even used a lump of Plasticine to make a model, take your two carefully selected blocks of wood and draw out the profiles as seen in side view. Make sure that the grain runs from head to tail through both the head and the body.

When you are happy with the imagery, use the tools of your choice to clear the waste. I used a band saw, but you can just as well use a bow saw, a straight saw and a


4"
5 5/16"
1 1/16"
1/2"
1 3/16"
FRONT A.
VIEW
A.
SIDE VIEW
3 3/16"
B.
3"
B.
6"
1 3/16"
1 1/16"
2 1/4"
2 1/4"
5/8"
A.
B.
PLAN VIEW
1/2" GRID
CROSS-SECTION
SIDE VIEW

rasp, a large coping saw, a gouge and a drawknife, or whatever gets the job done. Next, set the two parts down on the bench—so that you can see them in plain view—and draw the top views out on the partially worked surfaces. Don't fuss around with the details, just go for the big broad shapes. Once again, when you are pleased with the imagery, use the tools of your choice to clear the waste.

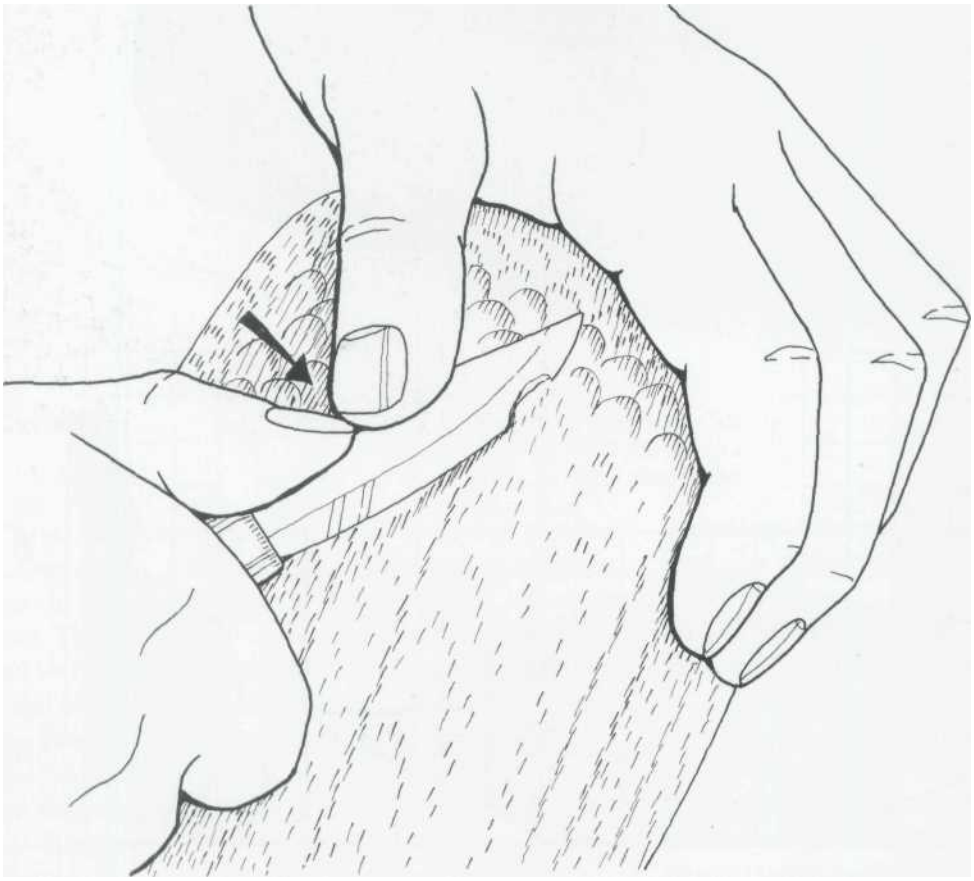
When the shapes have been roughed out, then comes the fun of whittling and modeling the details. Having noticed that this is the point in the project when most raw beginners lose their cool and start to panic, I should point out that there are no hard-and-fast rules. If you want to stand up or sit down, or work out on the porch, or work in the kitchen, or whatever, then that's fine. That said, your wits and your knives need to be sharp, you do have to avoid cutting directly into end grain, and you do have to work with small controlled paring cuts.

Of course, much depends upon the wood and your strength, but 1 find that 1 tend to work either with a small thumb-braced paring cut—in much the same way as when peeling an apple—or with a thumb-pushing cut that is managed by holding and pivoting the **knife** in one hand, while at the same time pushing against the back of the blade with the other hand. Either way, you do have to refrain from making slashing strokes.

When you come to the final modeling, start by sitting down and having a good long look at the duck. Compare it to the working drawings and any photographs that you have collected along the way. If necessary, rework selected areas until it feels right. When you reckon that the form is as good as it's going to get, use a rasp and a pack of graded sandpapers to rub the whole work down to a smooth finish. Avoid overworking any one spot; it is better to keep the rasp/sandpaper and the wood moving, all the while aiming to work on the whole form.

Finally, fit the neck dowel, run a hole down through the duck, drill out the washer recess on the underside of the base and the fixing hole on the front of the breast. Block in the imagery with watercolor **paint, give the** whole works a rubdown with the graded sandpapers, lay on a coat of beeswax or maybe a coat of varnish, and the duck is ready . . . not for shooting, but for showing!

STEP-BY-STEP STAGES



If you are looking to make a strong but controlled cut, you cannot do better than go lor the thumb-pushing paring approach. In action, the cut is managed by holding and pivoting the knife in one hand, while at the same time pushing against the back of the knife with the thumb of the other hand. Notice how the direction of cuts runs at a slicing angle to the run of the grain.

MATERIALS LIST

A Head (1)	1¾″×2½″×4½″
B Body (1)	3½″×5½″×10″
C Neck pivot (1)	½″ dowel×4″ long

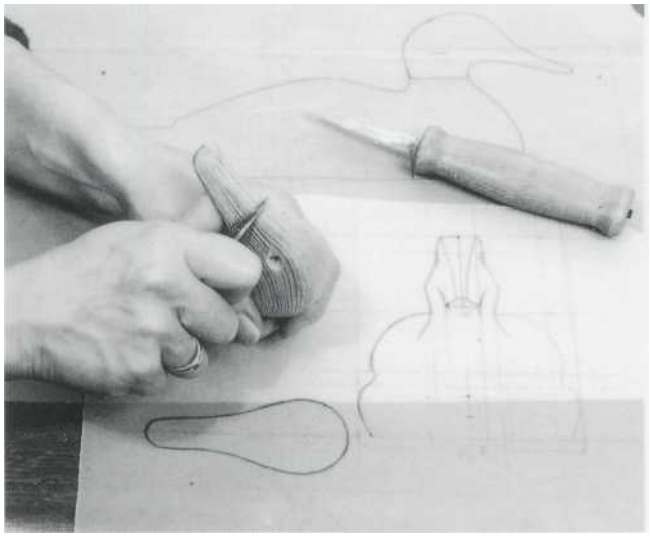
HARDWARE AND EXTRAS

D Glass/plastic eyes (2)

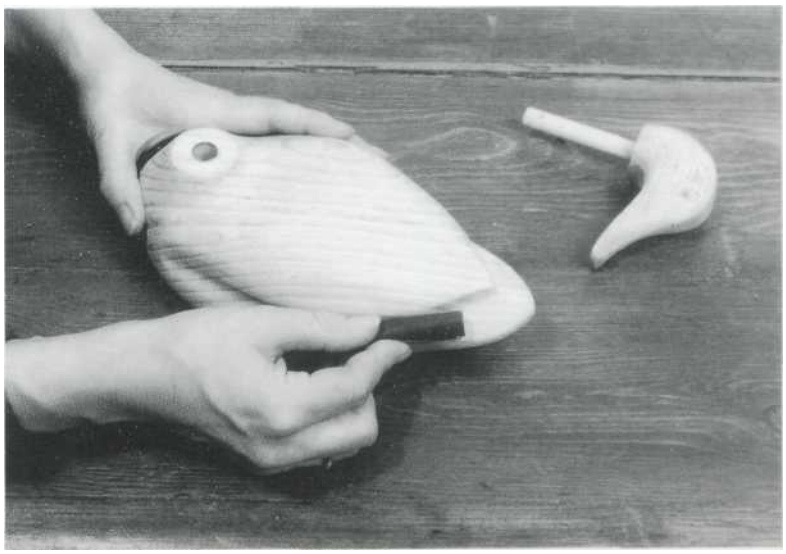
E Plastic washers to fit the dowel (2)

F Watercolor paint as used by artists: gold-yellow, red-brown, dark green, white, gray, blue and black

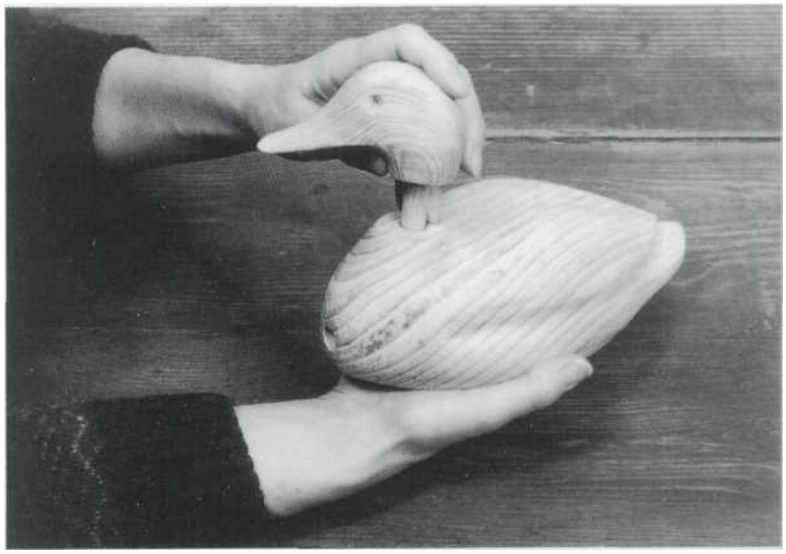
Note that all measurements allow for a small amount of cutting waste.



2 Use the thumb-braced paring cut to shape the characteristic cluck bill. This cut uses the thumb as a lever to increase the efficiency of the stroke. Always be ready to change knives to suit the cut—a small penknife blade for details, and a large sloyd knife when you want to move a lot of wood.



3 Use the graded abrasive papers to achieve a smooth finish. In this instance the paper is wrapped around a dowel that nicely fits the long scooped shape.



4 Slide the dowel into the neck socket and adjust the fit so that the head profile runs smoothly into the body. Be mindful that you might well need to modify the head and/or the body so that the two parts come together for a close-mating fit.

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5 Now, with the washer in place, ease the pin/peg through the breast hole and push it into the dowel hole. Use plastic or leather washers to ensure a good tight-turning fit.

SPECIAL TIP: SAFETY WITH A KNIFE

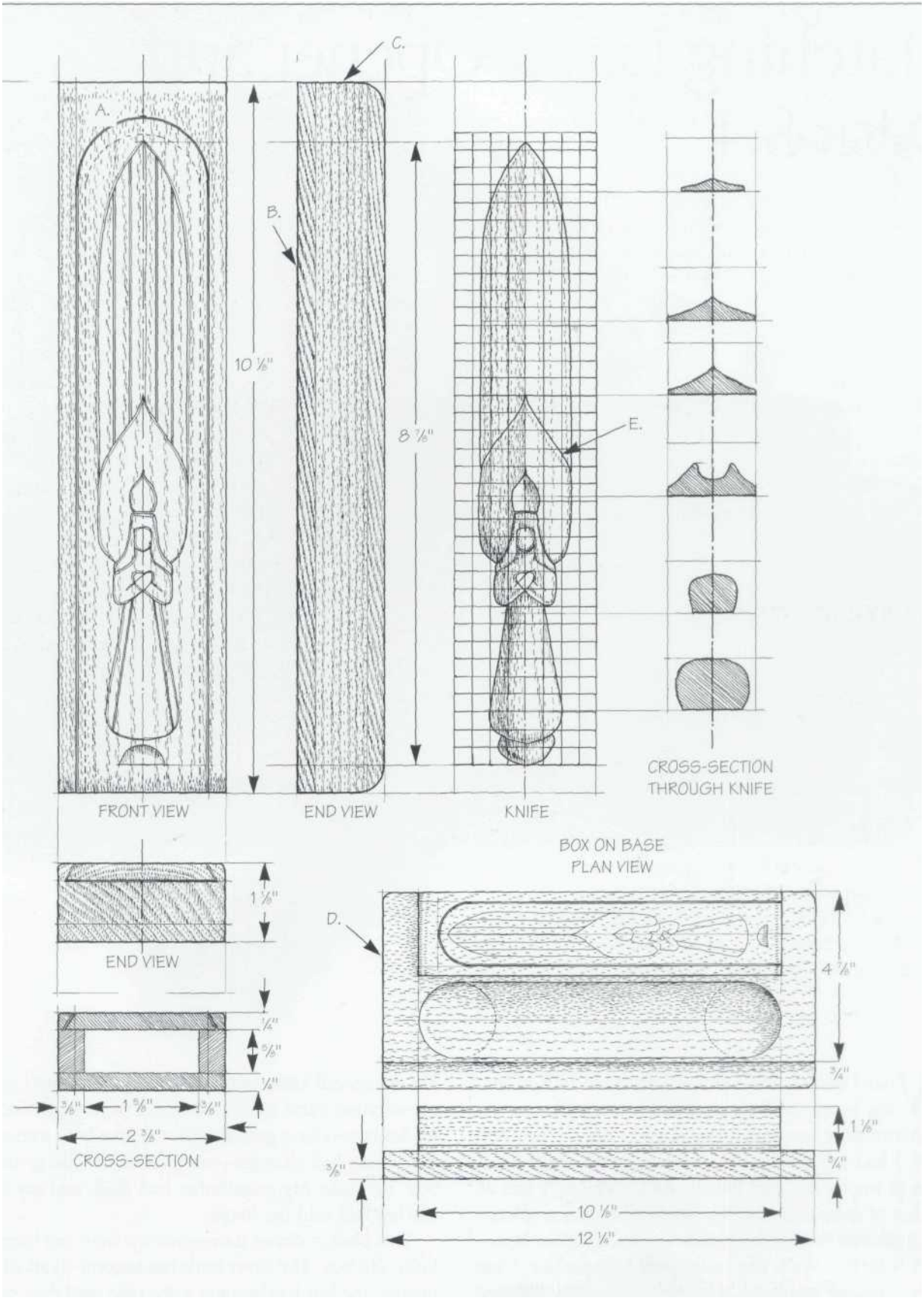
The degree of safety when using a knife will depend to a great extent on your stance and concentration. Okay, so there is no denying that a knife is potentially a very dangerous tool, and it's not a tool to use when you are tired or stressed, but that said, if the knife is sharp and the wood easy to cut, then you shouldn't have problems.

If you have doubts, then have a try out on a piece of scrap wood. And don't forget . . . a good sharp knife is much safer that a blunt one that needs to be worried and bullied into action.

Matching Letter Opener and Desk Set

When I was a school kid, I was obsessed with collecting knives and boxes. I had a box with a secret compartment, a box with a swivel-and-twist lid, and best of all, 1 had a beautiful old pen case dated about 1880, given to me by my grandfather. As for knives, I had all manner of dirks and daggers. My favorite was a stiletto-type knife that had a silver handle and a red leather case—really beautiful! Well, you know what kids are like, I was forever making up games and adventures that involved hiding things. Anyway, to cut a long, sad story short, I hid my special knife and box in my grandfather's garden, my vacation came to an end, and I went to school. And no doubt you have guessed when I came back a year later, everything had changed—no grandfather, no garden, no box, no knife. My grandfather had died, and my grandmother had sold the house.

This project draws its inspiration from my long-gone knife and box. The silver knife has become a carved letter opener, the box has become a pen case, and they both go together to make the perfect desk set.



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MAKING THE BOX

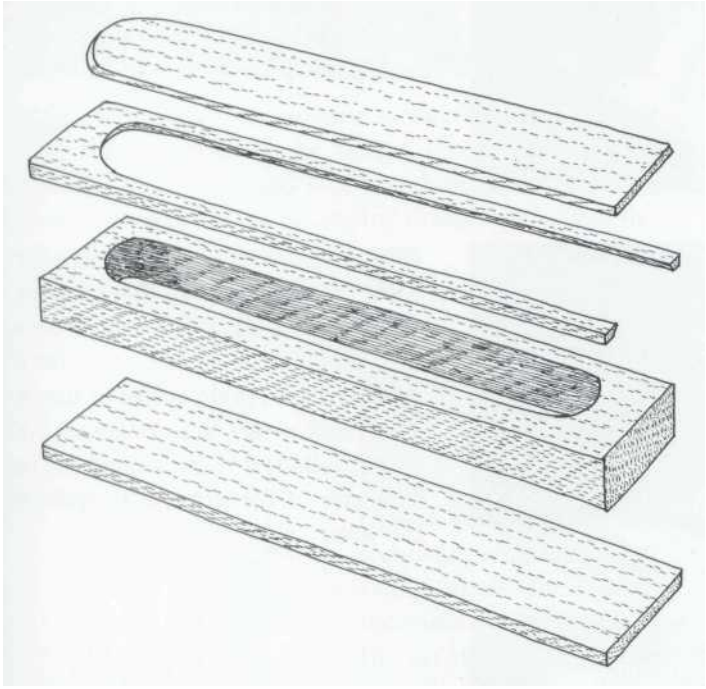
Having studied the working drawings and seen how the box is laminated up from three layers, take your three pieces of carefully chosen wood and pencil label them "lid," "middle" and "base." Set the middle section out with a center line, and use the 1 5/8"-diameter Forstner drill bit and the scroll saw to clear the waste. Clean out the cavity and take it to a good finish.

Take the lid piece and use a pencil, ruler and compass to draw out the design—meaning the shape of the sliding lid. This done, move to the scroll saw, set the table to "tilt," and fret out the lid. You should finish up with a lid edge miter that undercuts the lip of the frame.

When the four component parts for the project—the base, the hollowed-out middle section, the top frame and the lid—are all nicely finished, smear glue on the mating faces, sandwich them together and clamp up. Be sure to wipe up any glue that oozes into the inside of the box, or between the top of the middle section and the undercut lip of the frame.

Finally, the box is glue mounted on a simple pen tray base. Then the whole works is cleaned up with the plane and rubbed down to a smooth, round-cornered finish.

STEP-BY-STEP STAGES



1 When you have made the four component parts for the box—the base, the hollowed-out middle section, the lid, and the frame into which the lid slides—take the finest graded sandpaper and rub the mating faces down to a good finish. Pay particular attention to the inside of the hollow and the mitered edge of the lid frame.

CARVING THE BOX AND THE KNIFE

Carefully draw out the angel design, make a tracing, and then pencil-press transfer the imagery through to both the top of the sliding lid of the box, and the piece of wood that you have chosen for the knife. This done, take the tools of your choice and swiftly set in the lines of the lid design with a V-section trench. I prefer to use the knife to cut the incised lines, but you might well prefer to use a small V-tool.

When you work with the paper knife, start by fretting out the profile on the scroll saw. This done, take a small low-angled shoulder plane and clear the bulk of the waste from the blade. When you are happy with the basic form, use a knife to whittle the details. All you do is set the primary lines in with stop-cuts and then shave the wood down to the level of the cuts, so that selected areas are left standing in relief. For example: When you come to the skirt, slice a stop-cut around the line of the waist, and then shave the wood from the hem through to the waist, until the skirt takes on the characteristic conical and rounded shape. And so you continue, working here and there over the design, all the while setting in stop-cuts and cutting in towards the stop-cuts until you **achieve** what you consider to be a good form.

Finally, rub all the surfaces down to a smooth finish, give the whole works a thin coat of Danish oil, and then use beeswax to burnish to a sheen finish.

MATERIALS LIST

BOX

A Lid (1)	3/8" × 2 1/2" × 12"
B Box center (1)	3/8" × 2 1/2" × 12"
C Middle section (1)	3/4" × 2 1/2" × 12"
D Base (1)	3/4" × 5 3/8" × 12 1/4"
E Knife (1)	3/4" × 1 1/2" × 9 1/2"

Note—I used American cherry throughout.

SPECIAL TIP: CARVING THE DETAILS

If you have any doubts at all as to how the carving ought to go—meaning the shape and the modeling of the details—the best way is to make a full-size Plasticine working model. All you do is roll out the Plasticine to the required 3/4" thickness, cut out the profile as seen in the plan view, and then whittle and model the form in much the same way as you would with the wood. Making and using a model is a winner on many counts. You can easily replace the Plasticine if you make a mistake, you can use the Plasticine to make trial cuts and, best of all, you can use dividers to take step-off measurements directly from the model through to the wood.

2 Transfer the angel design through to the top of the lid, and to the knife. Be mindful that in both instances it's important that the design be perfectly aligned with the center line. Use a hard pencil so that the lines are firmly indented.

3 Use a small penknife to cut the incised lines that make up the design of the lid. Work each V section incision or trench with three cuts—first a single stop-cut down the center of the V to establish the depth, followed by an angled cut to each side of the stop-cut to remove the waste.

4 Having made a Plasticine model to help figure out the intricacies of the design, take a small nosing shoulder-type plane and swiftly reduce the bulk of the waste. Shape the blade by angling down each side of the center line.

5 Use the three-stroke whittling method to block **out** and partially model the various basic forms.

The working order is:

■ Define the perimeter of the form—the skirt, head or whatever—by making stop-cuts straight down into the wood.

■ Make angled cuts down into the stop-cuts to define the length and breadth of the form.

■ Use restrained easing and paring cuts to rough out the details as seen in the plan side and end views.

6 The broad modeling is best achieved by using a small-bladed penknife to make thumb-braced paring cuts. The technique wins on at least two counts—the thumb increases the efficiency of the stroke, while at the same time giving you maximum control. The cone shape of the skirt is achieved by first running a stop-cut around the waist, and then paring down at an angle toward the slop-cut.

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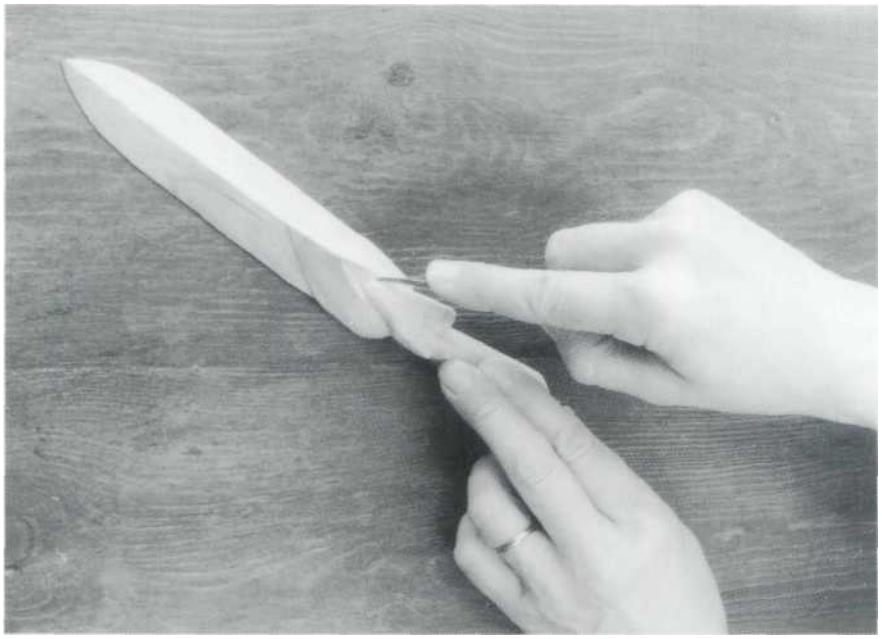
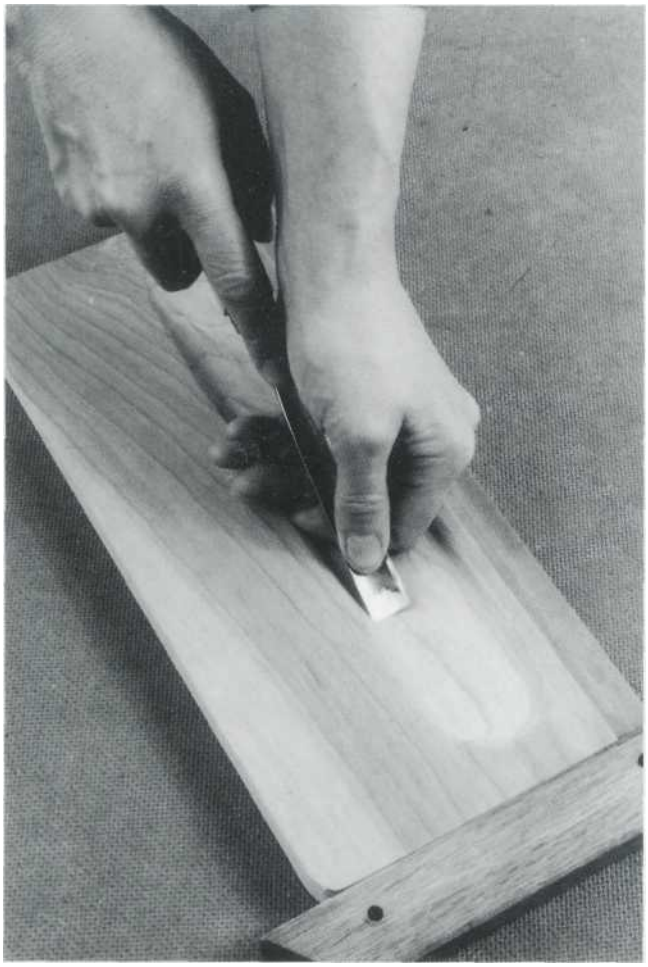


7 The V section that goes around the top of the head is achieved by repeatedly making a sequence of three cuts—a deep straight-down stop-cut to establish the depth of the V, followed by two cuts that angle down and in towards the bottom of the stop-cut.



8 Once you have drawn out the shape and position of the pen tray, use a shallow sweep gouge to carve out a smooth-sided dip or depression.

USING THE SCROLL SAW

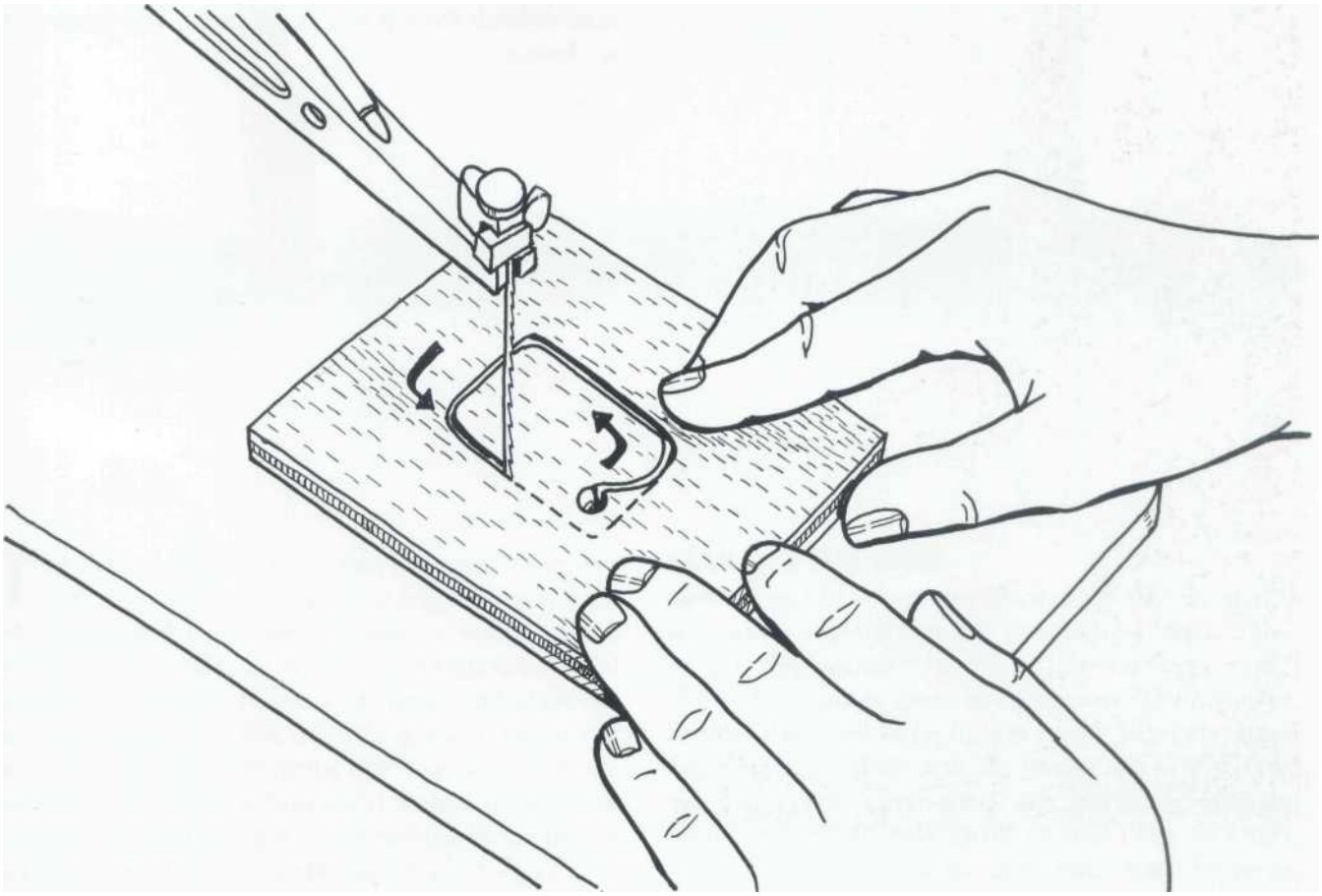
If you are new to woodworking and maybe a bit nervous, and you plan to make small fancy items like boxes, push-along, toys, chair backs or pieces of marquetry—meaning items using thin sections of wood that have a lot of delicately curved (fretworked profiles and pierced holes—then you can't do better than getting an electric scroll saw.

This machine, sometimes called an electric fretsaw or an electric jigsaw, is just about as safe as you can get. In truth, it is so safe that it is one of the few woodworking machines allowed in schools for young kids. In fact, I first saw one of these machines being used in a school by a ten-year-old—to make a jigsaw puzzle. Okay, so they can nip and worry fingers, but the working action is such that anything more than a grazed finger is almost impossible.

The scroll saw has a reciprocating blade, meaning a blade that joggles up and down as if to imitate the movement of a hand fret or coping saw. The bottom end of the blade is clamped in a chuck that is driven by the crankshaft, while the top end of the blade is clamped to the end of a spring-loaded arm. The blade is fitted with the teeth pointing downward, so that it cuts on the downstroke. In use, the workpiece is advanced across the worktable toward the joggling blade, and maneuvered so that the moving blade is always presented with the line of the next cut. The wonderful thing about these saws is that the resultant cut edge is so clean that it hardly needs sanding. If you are thinking about buying and using an electric scroll saw, the following tips and pointers will help you on your way.

Saw Table—There are about six machines currently on the market—German, British, Canadian and American. Though they are all pretty good, it is most important that you get an up-to-date machine that has a table-tilt option. This feature allows you to tilt the worktable so you can make a cut that is variously angled to the working face, as in this project. A good tip is to rub over the work surface with a white candle before use. It lowers the wood-to-table friction so that the workpiece glides rather than staggers.

Blade Clamp—From one machine to another, there are all manner of weird and wonderful mechanisms used to clamp the blade. For example, one machine has a clamping block that is tightened by means of an Allen wrench/



CUTTING A PIERCED WINDOW

In use, the workpiece is maneuvered and advanced so that the moving blade is *presented with the line of the next cut.*

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key, another has a pronged finger that supports pin-end blades, and yet another has a clamping block that is tightened by means of a large thumbscrew/wing nut. While each system has its good and bad points, I think overall the large thumb-screw is the best option. I say this because the Allen wrench option soon distorts, and the pin-holding mechanism on some machines is made of butter-soft, easy-to-bend metal.

Blades—The standard scroll saw blade is 5" long and flat-ended. Coming in a whole range of tooth sizes, from coarse through super fine, the blades are designed variously to cut everything from solid wood, plywood and plastic, to thin mild steel, brass and aluminum. If you find that the blade bends and drifts or burns the wood, then chances are it is badly tensioned and/or blunt and needs replacing.

Dust-Blowing *Mechanism*—When the saw is in use, the sawdust piles up and covers the line of cut so that you can't see where you are going. Though most scroll saws have a bellows and tube mechanism that blows the dust away from the drawn line, the pity of it is that the dust **is** blown directly into the user's face—all good fun! If this is a worry to you, then it's best to wear a face mask.

CUTTING AN INTERIOR PIERCED "WINDOW"

A good part of the pleasure of using a scroll saw is its ability to cut a perfect hole or "window" in the middle of a piece of sheet wood. For example, it is perfect for fretting out models, and for making pierced chair back slats—anything that is relatively small and intricate.

The working procedure for piercing enclosed "windows" is:

- Drill a pilot hole through the area of waste big enough to take the blade.
- With the machine unplugged, ease off the tension until the blade goes slack.
- Unhitch the top end of the blade from its clamping block.
- Pass the end of the blade up through the pilot hole and rehitch it to the top block.
- Retension the blade until it "pings" when plucked.
- Hold the workpiece firmly down on the table so that the blade is clear of the sides of the pilot hole, and then switch on the power.
- Fret out the "window" until the waste falls free.
- Finally, switch off the power and then release the ten sion, unhitch the top end of the blade, and remove the workpiece.

Classic Bow Saw

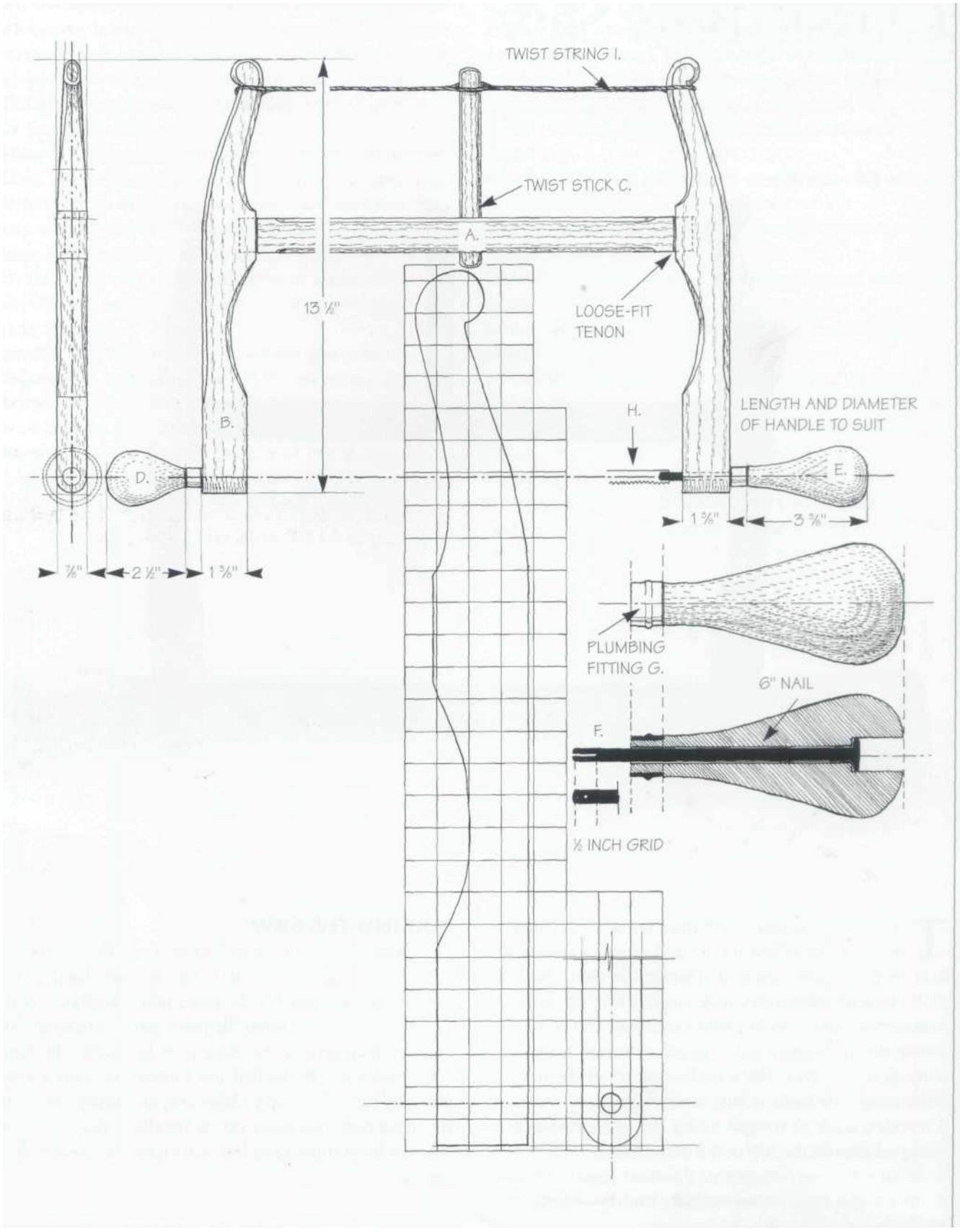
The classic bow saw, sometimes known as a Turner's saw, is a tool whose design and origins go way back into the dim and distant past. Though I've seen bow saws of this type illustrated on Greek vases, in English medieval manuscripts, in Albrecht Durer's etchings, and so on, the classic design is such that it is still as useful for curved work as it ever was. The actual workings of the saw are fascinating: The blade is held under tension by means of a wooden stick or tongue and a twisted twine that is wrapped around the top of the side cheeks.

What else to say, except that if you are looking to make a unique gift for a woodworking buddy—something really special—then this is a beauty!

MAKING THE SAW

First things first—buy your blade. I say this because, if your blade is a different size than the one used in this project, you can modify the other material sizes to suit.

The bow saw is made in three parts. There are the handles that need to be turned on the lathe; the fancy frame sides or cheeks that are fretted out with a scroll saw, coping saw or even a bow saw; and finally, there are the metal parts that make up the handles. Okay, so it does sound a bit complicated, but don't panic, it's as simple as can be.



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SHAPING THE FRAME

Having pencil-press transferred the designs through to the wood, fretted out the shaped ends, and used a straight saw to cut out the crossbar, use a small spokeshave and a plane to skim the three component parts down to a good finish. Cut chamfered edges on the crossbar and the cheeks and generally round over the curved shapes, all as shown in the working drawings.

When you come to cutting the mortise and tenon joints—meaning where the crossbar fits into the end cheeks—all you have to remember is that the joints both need to be a loose fit. The best procedure is to cut the joint for a good push fit, and then trim the ends of the tenon to a rounded finish so that they are an easy rocking fit in the mortise.

Establish the handle centers on the bottom ends of the cheeks. Then run them through with a hole that is a loose fit for your 6" nails. Finally, use a piece of offcut to make the twist stick, sometimes called a toggle or a tongue.

TURNING THE HANDLES

Having studied the working drawings and seen how the two handles are quite different in length, take your chosen piece of wood—we used maple—and turn the two handles in one piece. Make sure the stubs or spigots fit your metal ferrules, and then rub them down on the lathe and part off.

As to how you drill the holes through the handles, it really depends on your workshop and equipment. I found that the best way was to grip and support the handle in the four-jaw chuck—meaning the chuck on the lathe—and then use a drill chuck mounted on the tailstock end of the lathe. The good thing about this method is that it is a foolproof way of making sure that the holes are perfectly centered. All I did was drill the larger diameter recess hole and then follow through with a smaller diameter hole.

When you have made the handles, all nicely smooth and drilled, then comes the tricky business of fitting the metal parts. It's best to start by fitting the ferrules. Take your metal tube (I used two copper plumbing fittings, but you can just as well use a slice off the end of a brass tube) and cut it off so that you have two 1/2″ lengths or rings. Use a file and steel wool to polish the rings to a smooth, shiny finish, and then tap them in place on the turned handle stubs.

Finally, pass the 6" nails through the handles and the ends of the frame, cut them to length with a hacksaw, and cut slots into the ends of the nails so that they fit your chosen bow saw blades. Mark the position of the blade-end holes. Then run 3/32"-diameter holes through the nail ends, so that you can secure the blade ends with small nails or split pins.

PUTTING IT TOGETHER

When you have made all six component parts—the two scrolled cheeks, the crossbar, the two handles and the twist stick—then comes the fun of putting the saw together. Start by fitting the H-frame together. This done, pass the slotted nail ends through the bottom ends of the cheeks and fit the blade with the pins. Make sure that the teeth are looking away from the largest of the two handles. Wrap three or four turns of strong twine/cord around the fancy ends of the cheeks and knot the ends of the cords together to make a loop. Finally, slide the twist stick in place between the turns of twine and twist it over and over so that the cheeks pull apart and the blade is held under tension.

SPECIAL TIP

Since the bow saw cheeks are put under a lot of tension and stress, it's vital that you choose the best possible wood. I've checked around and seen that the handles are usually made from beech, maple or ebony, and the H-frame made from beech or ash. We have gone for an ash frame and maple handles.

MATERIALS LIST

FRAME	
A Crossbar (1)	½″×⅞″×12″
B Frame cheeks (2)	⅞″×2″×14″
C Twist stick (1)	¼″×⅜″×6½″
TURNED HANDLES	
D Large handle	2″×2″×14″—this length allows for a good amount of turning waste
E Small support handle (1)	
HARDWARE AND EXTRAS	
F Metal rods to hold the blade	6″ nails (2)
G Metal ferrules	½″-diameter tube (2)
H Bow saw blade	12″ blade
	twist cord, 60″ long
I Strong waxed twine	8′ long
J Split pin	

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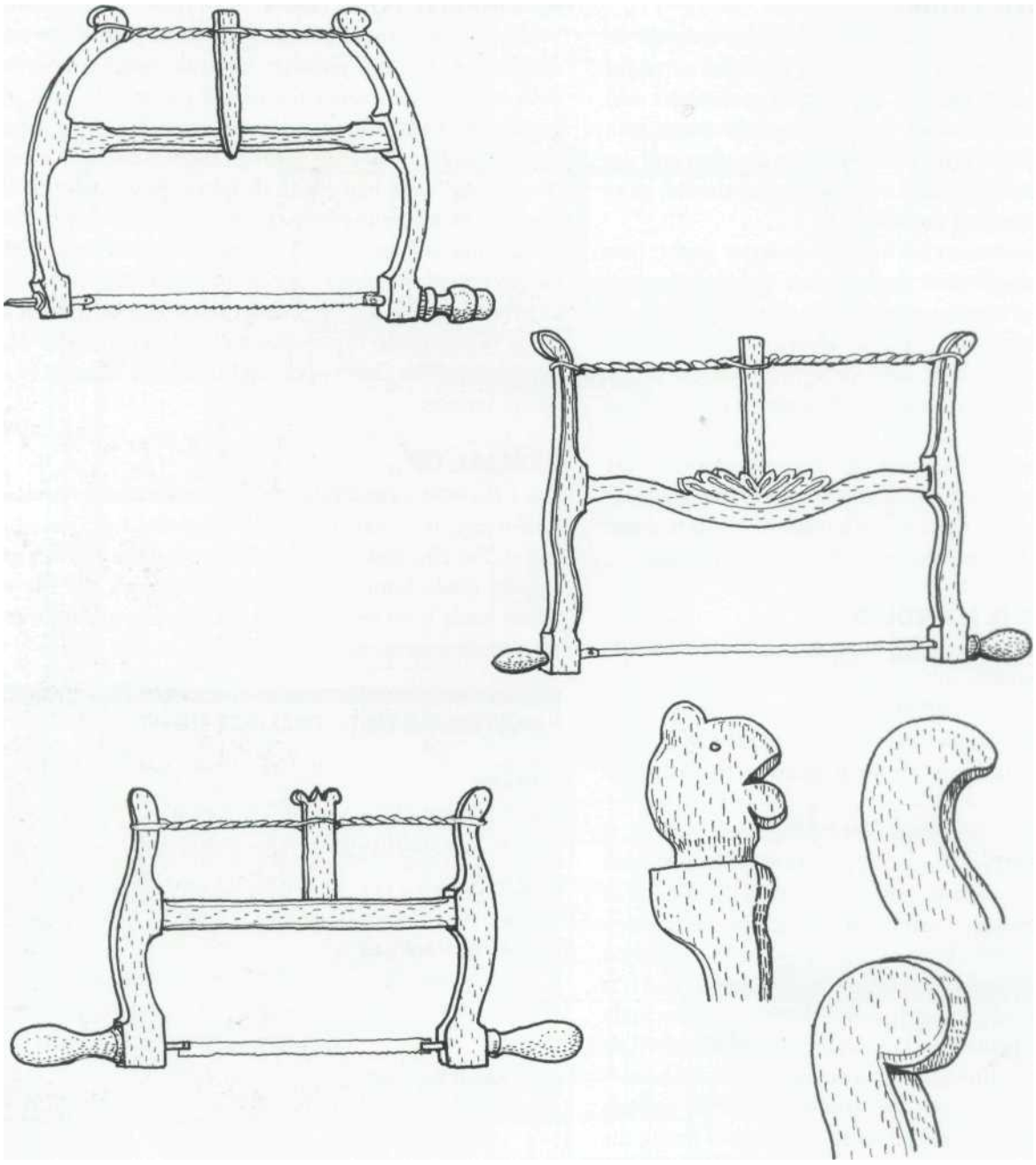

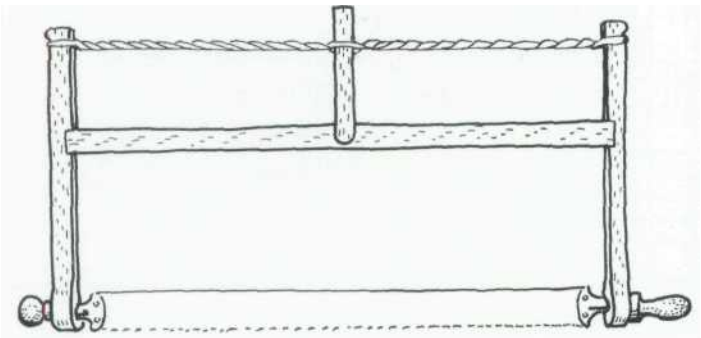

STEP-BY-STEP STAGES

1 An old English bow saw with curved cheeks and stop-chamfered details is shown at top left; an old English bow saw with unusual carved detail at top right. An English bow saw with a whittled twist stick is shown at center left; a selection of carved cheek scroll designs at center right. Shown at bottom, a European bow saw tends to be bigger, with straight cheeks and a much wider blade.

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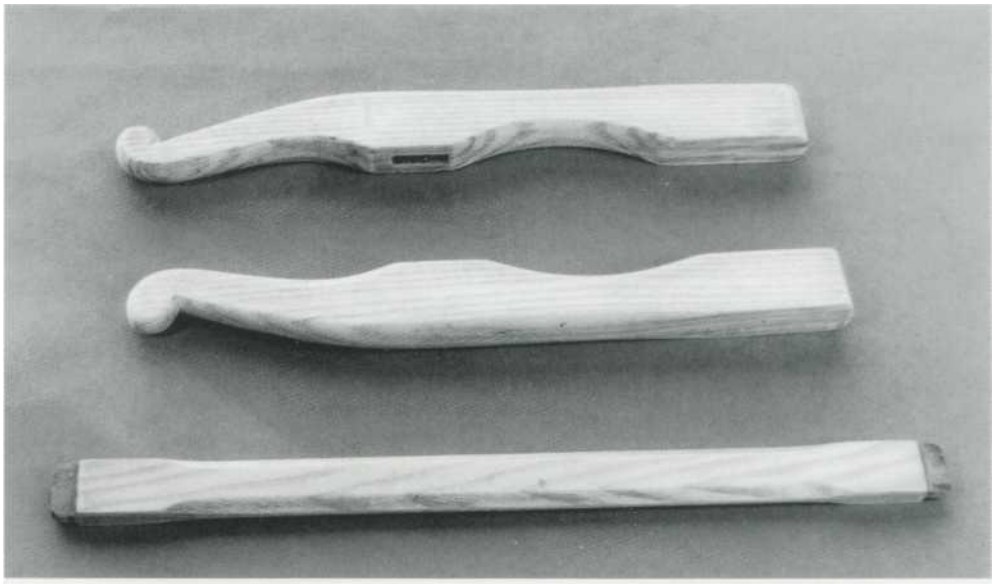
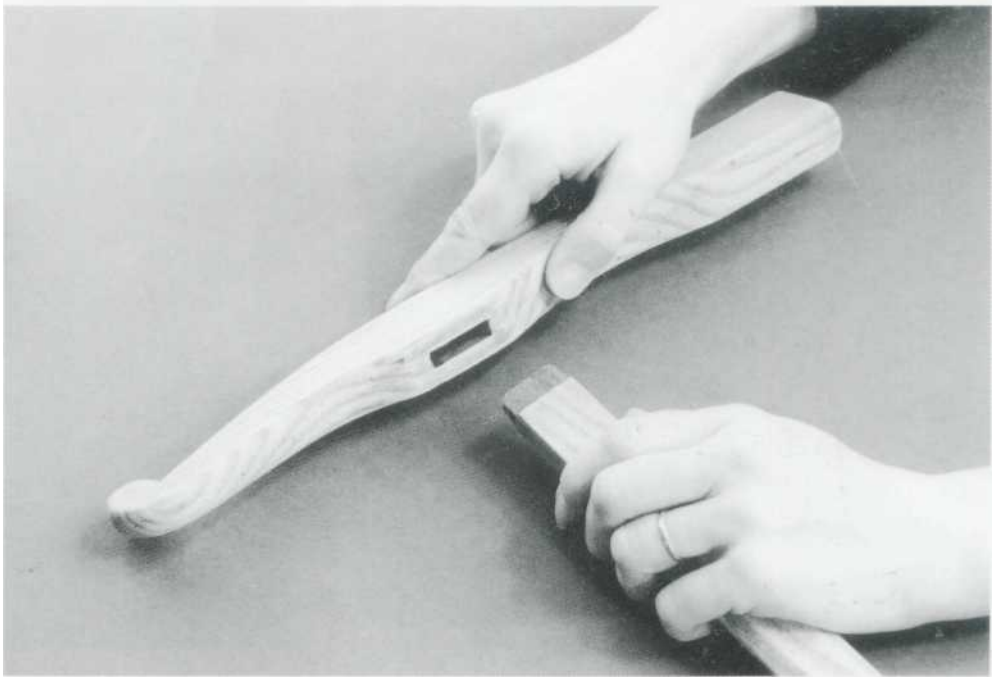
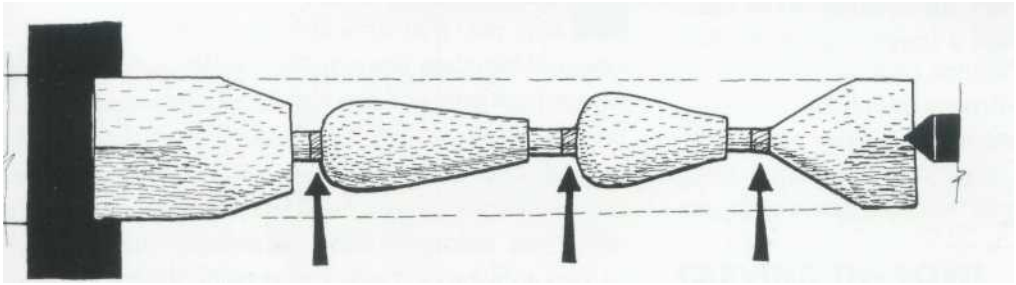
2 The three parts that go to make the H frame: the two scrolled cheeks and the crossbar. If you look closely at this photograph and compare it to the finished project, you will notice that I had to shorten the crossbar to fit the only available blade.

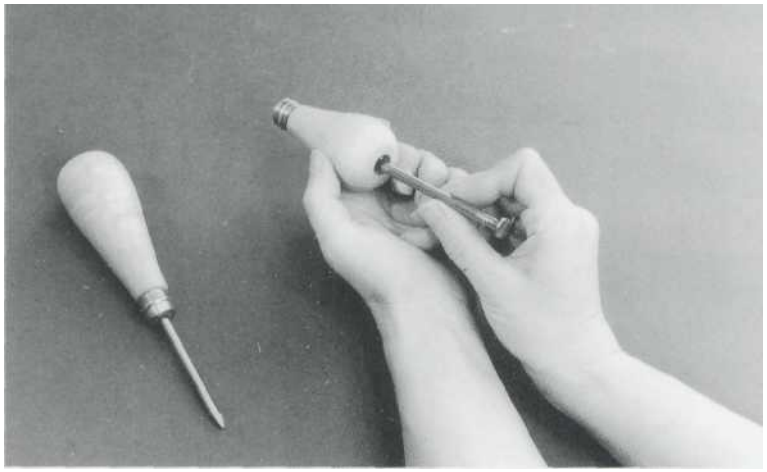


3 Trim and adjust the tenon so that it is a loose rocking fit in the mortise. Notice how the corners of the mortise need to be nipped off at an angle.

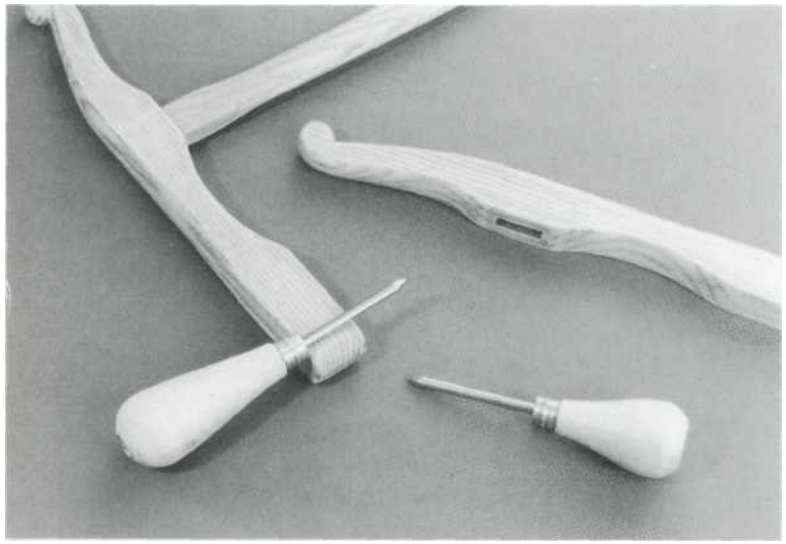




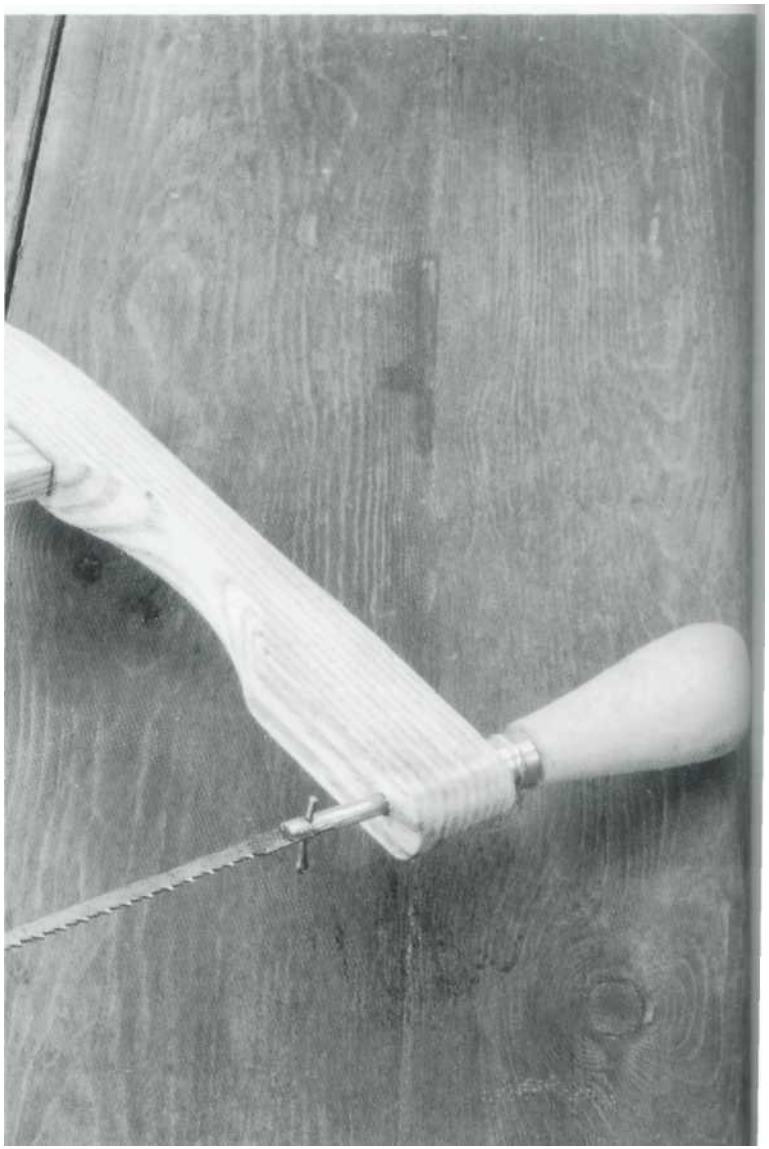
4 The on-lathe sequence—from left to right—the headstock waste, the parting waste, the large handle, the ferrule stub, the parting waste, the small handle, the ferrule stub, and finally the parting and tailstock waste. Note that the arrows indicate the parting waste.



5 Bend the nail slightly and pass it through the handle for a tight captured fit. See how the nail head fits snug and flush in the recess.



6 Check the length of the nail against the width of the frame and then mark the position of the blade slot accordingly. If you need a longer nail stub, then deepen the recess hole.



7 Slide the blade in the slot and fix it in place with a split pin. If at some time you need to fit a slightly longer blade, then you can slide washers on the nail between the ferrule and the cheek.

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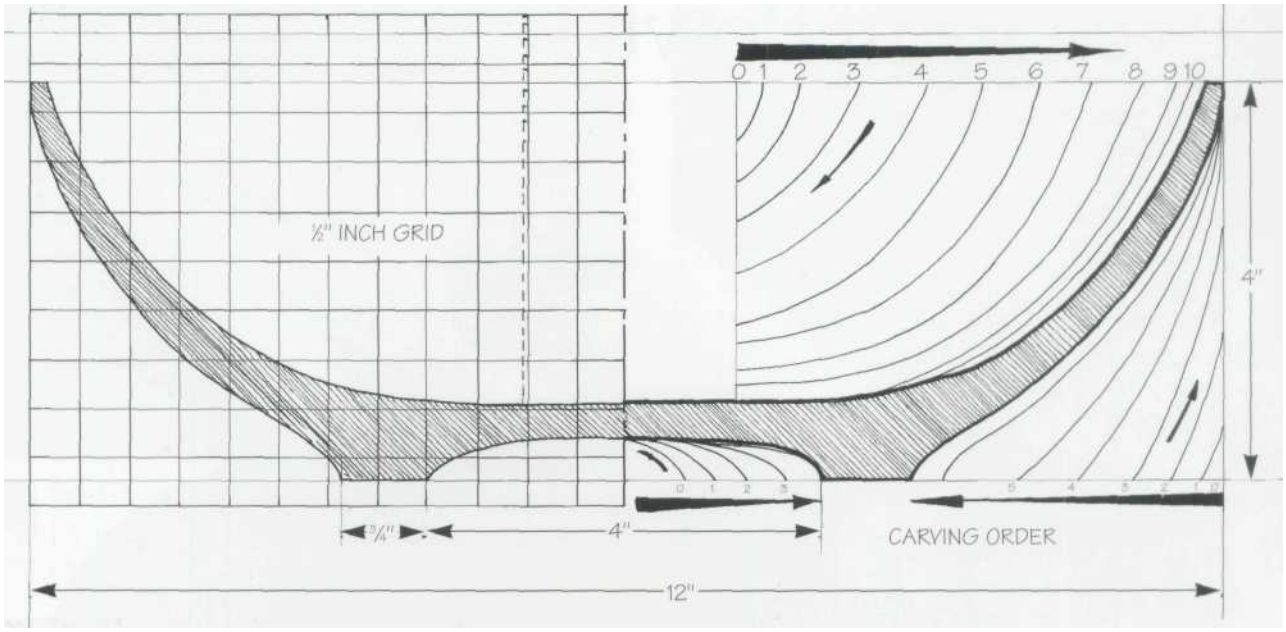
Carved Fruit Bowl

There is something magical about carving bowls. Do you know what I mean? One moment you have a slab of wood—nothing very special, just a piece of wood that might or might not end up on the fire—and the next moment you have a carved bowl that is a useful part and parcel of your life. We have this bowl that my Welsh grandfather made. It wouldn't win prizes and it isn't so beautiful, and it is a bit stained and has somehow been slightly scorched on one side, but for all that, it has always been with me. When 1 was a kid with chicken pox, the bowl was filled with apples and placed beside the bed; it was beside me when I was studying for my exams; it was given to me when I got married, and no doubt I will give it to one of my sons somewhere along the line. It has become an heirloom, something precious!

So there you go, if you are looking to make a special gift, one that might well see the next millennium in and out, then perhaps this is the project for you.

CARVING THE BOWL

Before you do anything else, you need to search out a block of easy-to-carve wood about 4" thick, 12" wide, and 12" along the run of the grain. You could use a wood like lime, a fruit wood, a piece of yellow pine, or whatever, as long as it's relatively easy to carve and free from splits and knots.



Pencil label the two 12" X 12" faces, one "top rim" and the other "foot rim." Now, with the slab set "top rim" face uppermost, first draw crossed diagonals to establish top-center; then use the compass or dividers to scribe out two circles, one with a radius of 6" and one with a radius of 5 1/2". Rerun this procedure on the "foot rim" side of the slab, only this time have the two circles at 2 3/4" radius and 2" radius. When you're happy with the way the wood has been set out, use a band saw to cut out the blank. This clone, move to the drill press and run a good size pilot hole into the center of the "top rim" side of the wood. Drill down to a depth of exactly 3 1/4". 1 used a 2"-diameter Forstner bit, but a l"-diameter would be fine. Being mindful that the bottom of the hole marks both the level of the inside bowl and the thickness of the base, it is vital that you don't go deeper than 3 1/4".

With the workpiece set down on the bench so that the "top rim" lace is uppermost, take a mallet and a straight, shallow sweep gouge and work around the rim of the drilled hole cutting back the waste. The working procedure should go something like this: Work once around the hole scooping out a ring of waste, work around this initial ring scooping out another ring of waste, and so on, all the while backing up until you reach what will become the inside rim of the bowl. When you have cleared one level of waste, return to the edge of the drilled hole and start over. So you continue, clearing the waste level by level until you begin to establish the beautiful shape of the inside of the bowl.

Use whatever tools best do the job. For example, 1 started with the straight gouge and the mallet, then changed to a front-bent gouge, and finally I switched to using a small hooked knife for tidying up.

When the shape of the inside of the bowl is well established, turn the workpiece over so that the base is uppermost, and set to work carving and shaping in much the same way as already described. The carving procedure for the outside of the bowl is pretty straightforward, only this time you need to work in two directions—from the inside edge of the foot ring and in toward the center of the base, and from the outside edge of the foot ring and out and down towards the rim.

And so you resume, carving the inside of the foot ring a little, carving the bold convex shape of the outside of bowl profile, carving the inside of the bowl a tad more, and so on and on, until the wall thickness ranges between about 3/8″ at the rim to 5/8" outside the foot ring. And of course, all along the way, you have to keep your tools razor sharp so that each and every cut is clean, crisp and controlled. As you get nearer to the beautiful bowl shape that is hidden just below the surface of the wood, you have to be more and more cautious with your cuts.

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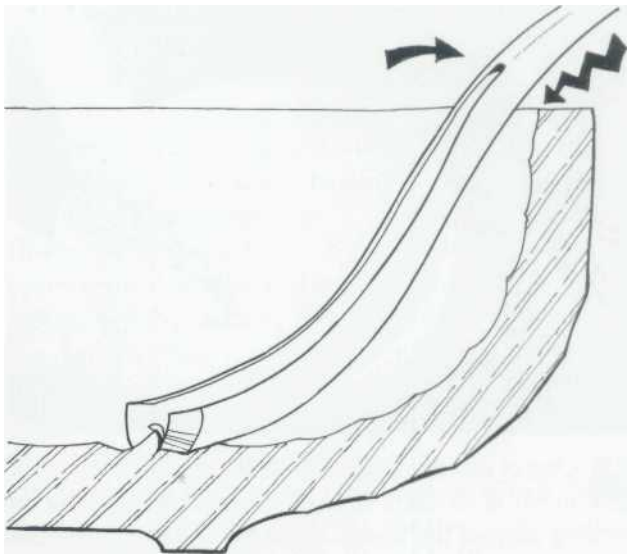
SPECIAL TIPS AND RULES OF THUMB

It's all straight forward, as long as you stay with the following guidelines:

■ Try to set up a work rhythm—carve for a few minutes, then stroke the tool on the stone and strop, then stand back and be critical, and then go back to a few minutes of carving, and so on. You will find that this way of working ensures that everything is controlled . . . the tools slay sharp, you have time to assess your progress, and you don't get tired.

■ As the bowl nears completion, you will find that it is more difficult to grip and hold the bowl. The best way is to either cradle it in your lap or nestle it on a pile of rags.

■ When you are carving the inside of the bowl—when it's nearly finished—you have to be extra careful that you don't lever on and break the relatively fragile rim. To prevent this end, you might need to use one of the bent gouges rather than a straight gouge. I would recommend either a no. 5 bent gouge at about 3/4" wide, or perhaps a no. 7 spoon gouge at about the same width. Be mindful that the flatter the sweep (meaning the shape of the blade in cross section) the greater the chance that the corners of the blade will cut and tear the wood.



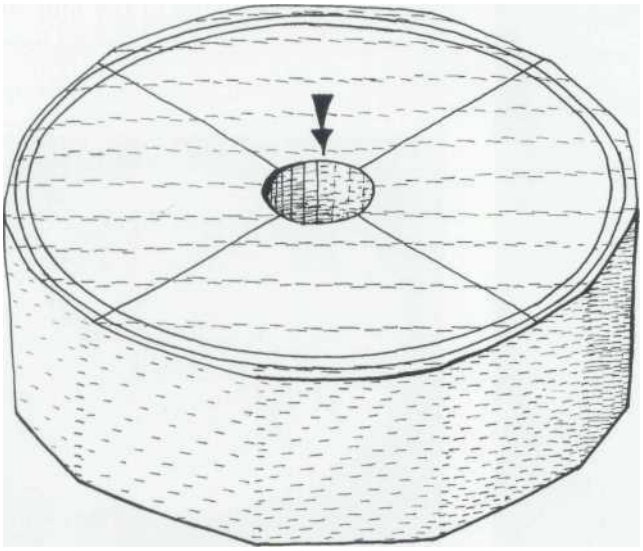
CARVING THE BOWL INTERIOR

*The swooping shape of the bent **gouge** lets you carve the concave curve without levering the shaft of the tool on the **fragile** rim.*

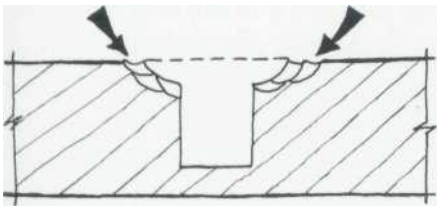
STEP-BY-STEP STAGES

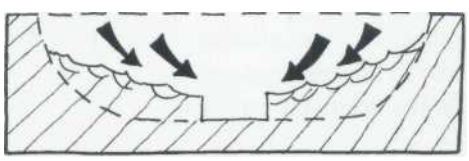
MATERIALS LIST

A Piece of wood (1)	4″×12″×12″—with the grain running along the length, meaning across the bowl



1 Having established the center of the square slab by drawing crossed diagonals and cutting the circular blank, use the 2" diameter Forstner bit to run a 3 1/4-deep pilot hole down into the center (top). Work around the hole clearing the waste (bottom left). Clear the waste level by level, all the while backing up from the pilot hole through to the rim (bottom right).





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2 One of the easiest ways to bring the bowl to a good finish is to use a hooked sloyd knife. As you are working around the inside of the bowl, be mindful that all along the way you will need to adjust your angle of cut to suit the ever-changing run of the grain.

3 When you come to carve the inside of the foot—meaning the inside of the base ring—use small, controlled cuts, with one hand pushing and the other guiding and being ready to break. Notice how in this instance you can lever the shank of the tool on the relatively strong foot rim.

4 The beautiful concave curve shape that runs down from the outside of the foot rim is achieved by thrusting down with the blade and levering back with the handle.

5 All along the way you will have to make repeated checks with the caliper. Try to aim for a section that starts relatively thick at the base and gradually tapers up to a thin rim.

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A GOOD WOOD GUIDE FOR CARVING

Wood carving is a wonderfully fulfilling and exciting area of woodworking, but only, if you choose the right wood. When 1 first started carving, I had in mind to carve a female torso, a Venus. I'm sure you know what I mean, a bit like Marilyn Monroe, but more so. Though my teacher told me to use lime, when I arrived at the wood yard and saw the astronomical prices, 1 was swiftly talked into buying—at a quarter of the price of lime—a massive piece of I-don't-know-what.

Well, when 1 got my "bargain" wood back to the workshop, it was a nightmare. The wood was green and wet, it was lull of iron-hard knots, it started to warp and split the moment I started carving, it made my tools rusty, the grain was wild and twisted—I could continue listing its terrible qualities. Yes, I did manage to finish my carving, but at what cost to my strength and sanity? It was truly awful, a sort of mad mix-up between Marilyn Monroe and a glandular Guernsey!

The moral of this sad little tale from my teenage years is there are no shortcuts, and there are very few bargains. You *must* use a piece of good wood. The following listing will help you on your way:

Alder—A sapwood tree common in low-lying areas. A wood traditionally used by North American Indians and early settlers, it is especially good for bowls and general kitchenwares.

American Whitewood—Known variously as tulipwood, basswood, canary wood, and many other names besides, this is a soft, easy-to-carve wood.

Apple—A hard dense, close-grained fruitwood, it comes in small sizes, carves well and takes a good polish. Apple is traditionally used for small items of treen (woodenware), and for kitchenwares.

Beech—A heavy, relatively easy-to-carve wood that has a yellow-gold sapwood and a reddish heart. Beech is particular! good for carved furniture.

Boxwood—A beautiful, pleasant-smelling, butter-smooth wood that is extremely hard and close-grained. If you want to carve items like jewelry, hair combs, small dishes and boxes, then boxwood is a good choice.

Cedar—Pencil Cedar is a favorite wood for carving. It cuts to a clear pink-brown finish.

Cherry—American cherry is a close-grained, hard-to-work, reddish brown wood that comes in relatively small widths. It carves well and can be brought to a wonderful high-shine finish.

Hickory—Straight-grained with a white sapwood and reddish brown heartwood, hickory is often the first choice for large sculptural carvings.

Horse Chestnut—White if it is felled in winter, and yellow-brown if it is felled later in the year, this wood is especially good for carved furniture details and for dairy and kitchenwares.

Holly—A close-grained, ivory-white wood that carves well and takes fine details, it is a good wood for small desktop toys, and kitchenwares.

Lime—English lime is one of my favorite woods. Butter-colored, close-grained and easy to carve, it is the traditional choice for architectural work, like mirror surrounds, coats-of-arms, small sculptures and interior trim. Though linden or basswood are often described as being the same as lime, they are to my way of thinking quite different.

Maple—Soft maple is the traditional choice for general carvers—used for making such things as furniture, domestic wares and musical instruments—while rock maple is preferred for heavier items like sports gear and some laundry wares.

Pear—A pink-brown wood that has a close-grained, satiny finish. It's really good for kitchenwares.

Plum—One of my favorite woods. Though it is certainly very difficult to carve, the color and texture are special—especially good for small presentation pieces.

Sycamore—A hard, light-colored wood, it carves and finishes well. Sycamore is a top choice for dairy and kitchenwares, where it is important that the wood leave no smell or taint.

Yellow Pine—White to reddish light brown, it is good for large sculptural carvings and interior details. It has been used traditionally in shipbuilding and interior joinery. If you order the wood unseen, be sure to specify "smooth first growth." If you don't, there is a good chance that you will be given poor-grade, coarse and knotty second growth.

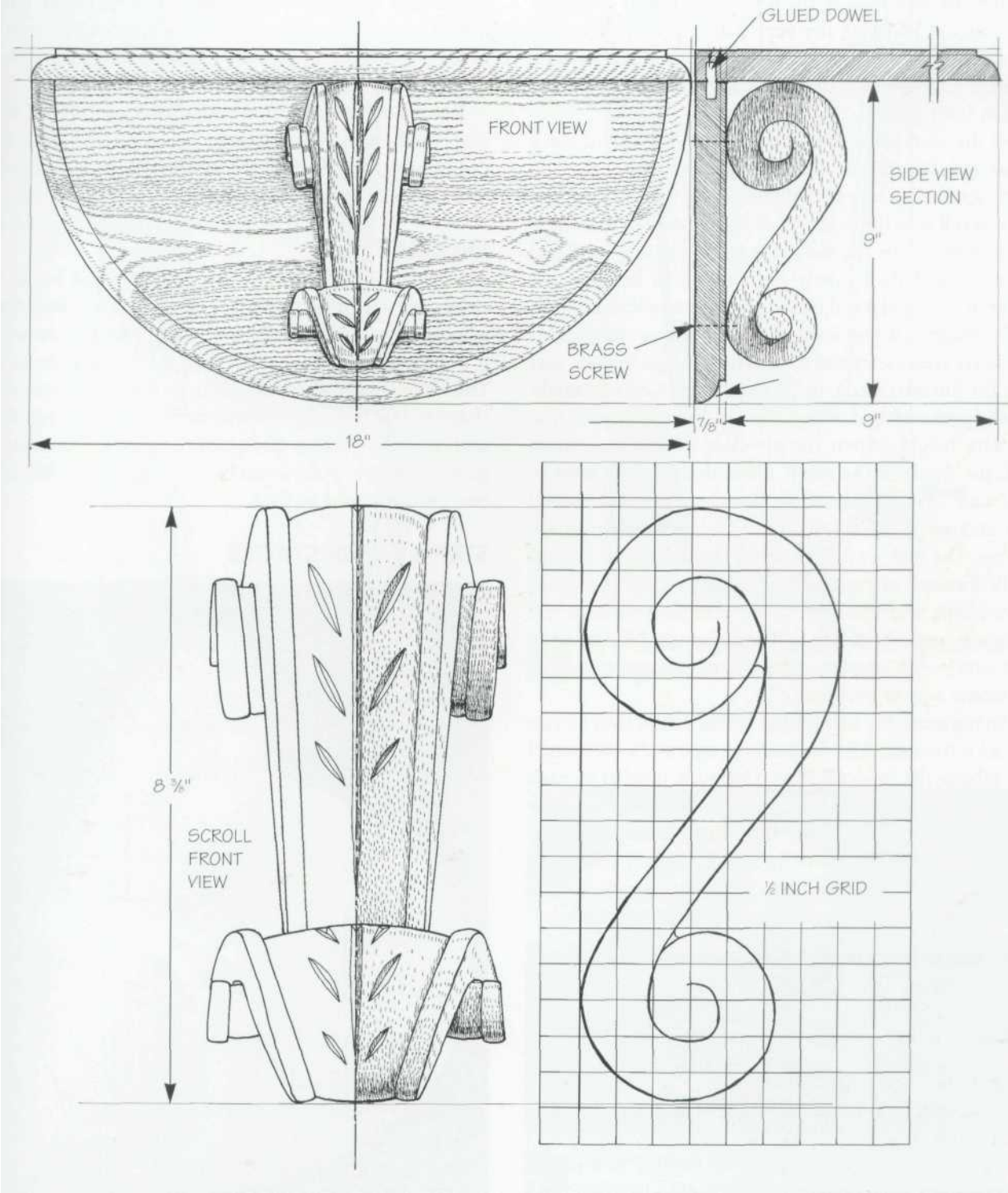
Gilded Scroll Shelf

My dictionary defines a console shelf as being an ornamental bracket—especially one used to support a bust—while a scroll is described as being a decorative carving in the form of a stylized roll of parchment. Okay, not very exciting you might think, just a shelf and a bracket. But give the shelf a semicircular form and an ogee-type lip profile, embellish the scroll with a wee bit of carving and coat of gold paint, and then put the two together, and suddenly—Pow!—you have a really special eye-catching item, a truly unique and dynamic piece of woodwork.

MAKING THE SHELF

The actual shelf is very straightforward—really no more than two half-circles butted and dowelled at right angles. That said, you do have to be mindful at the layout stage that the top board—the one that will become the shelf surface—needs to measure the radius of the circle from front to back, plus the thickness of the wood.

Use a compass, ruler and square to set out the wood: Fret the two forms out with a band saw. Use a router or moulding plane to cut the lip profile. Then use glue and hidden dowels to butt the forms together at right angles.



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MAKING THE BRACKET

Having chosen your block of easy-to-carve wood, press transfer the side view of the scroll through to the wood and then cut it out on the band saw. Then run a center line down the front lace. Next, take some masking tape and use it to establish the tapered shape of the scroll as seen in front view.

Set the workpiece side-down on the bench and use a mallet and shallow-sweep straight gouge to lower the side of the scroll. The best way of visualizing the lowered side of the scroll is to think of it as a mountain road that starts at the center of the big end of the scroll, curls around and downhill, and then slowly back uphill to finish at the center of the small scroll. Staying with this mountain-and-roads imagery, if you leave the scroll on its side, and if you lower your viewpoint to bench level, you will see that with the finished scroll, the scroll centers—or you might say the peaks around which the roads curl—are both at the same height. When you are clear in your own mind as to the shape of the scroll, carve down to the level of the "road" on one side of the scroll, then flip the scroll over and work the other side in identical mirror-image reverse. The best way of ensuring that the scroll is symmetrical as seen in front view is to slightly lower the "road" on one side and then the other, and then back to the other side, and so on. You will find that this little-by-little approach—with constant reference to the center line—is the easiest way to proceed.

Having made the sides of the scroll, turn it over so you can see it front-on. Use the masking tape and a soft pencil to establish the 1/4"-wide track that runs parallel to each side edge. When you are happy with the guidelines, use a knife and gouge to work and model the central area until it is lowered by about 3/16" and is slightly convex.

When you have what you consider is a well-formed and modeled scroll, use the graded sandpapers to rub it down to a smooth finish. Make sure that all the nooks and creases are crisp and clean. This done, draw the stylized foliage imagery on the front face of the scroll, incise it with the knife, and then give the whole works a coat of matte white undercoat paint, followed by a coat of best-quality gold paint.

Run a couple holes in from the back of the shelf support, use brass screws to fix the bracket to the shelf, and finally give the whole works a coat of thin varnish and/or a burnishing with beeswax polish.

MATERIALS LIST

SHELF BRACKET

A Top of shelf (1)	7/8" × 9 7/8" × 18"
B Back board (1)	7/8" × 9" × 18"
C Carved bracket (1)	4" × 5" × 10"

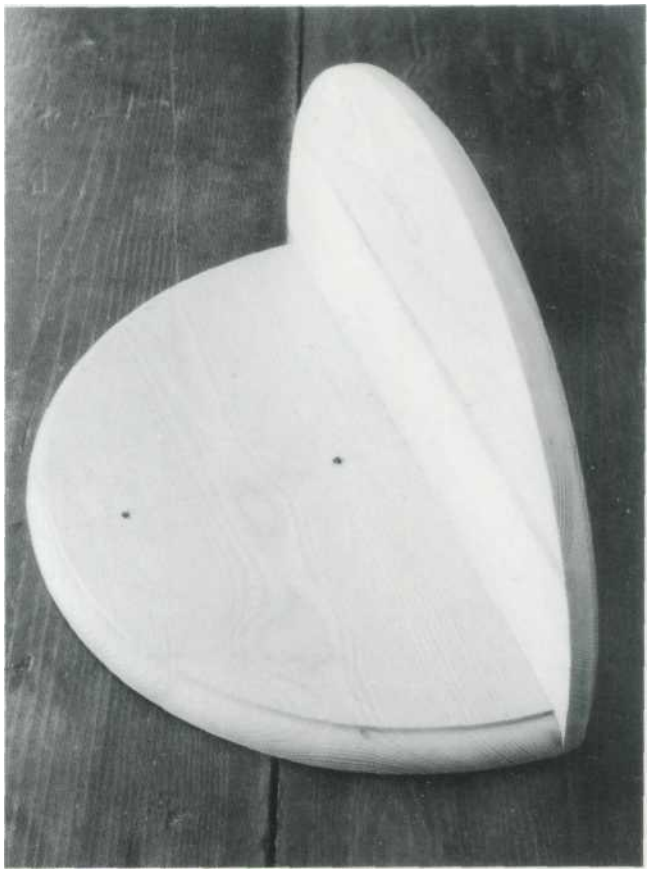
HARDWARE AND EXTRAS

D 2" brass countersunk screws (2)
E White matte undercoat paint
F Best-quality yellow-gold paint or gilding paste

SPECIAL TIP

Though generally in woodcarvmg your wood has to be attractive, straight-grained, free from splits and knots and relatively easy to carve, there are times when, as the wood is to be painted, you don't have to worry about its looks. This being the case, you could go for an inexpensive, characterless but easy-to-carve variety like jelutong. That said, if you relish the notion of the project but want to go for a uniform plain wood blond look, then 1 think your best choice would be lime.

STEP-BY-STEP STAGES



1 Butt the two halves of the shelf together and fit with glue and secret dowels.

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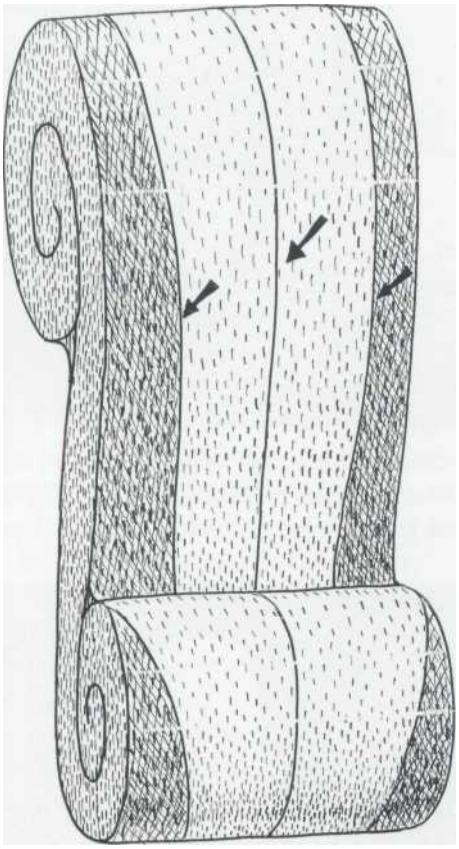
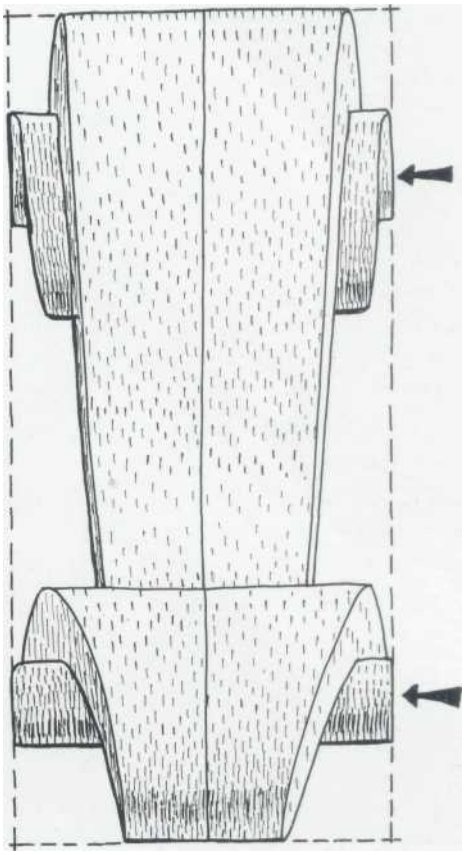
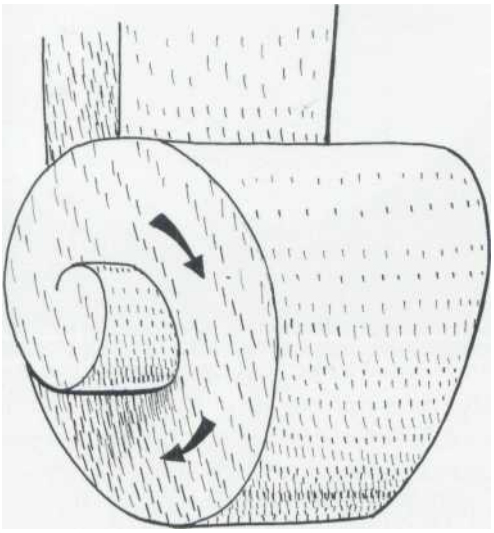


2 When you have made the blank and used the masking tape to establish the shape of the bracket as seen in front view, shade in the waste that needs to be cut away. Note that the arrows indicate the center line and the sides.



3 If you have carved it correctly, you will see that the scroll peaks are at the same level.



4 The mountain road analogy perfectly describes how the side-face curls down, around and up. Be watchful as you lower the "road" that the "cliff face—meaning the face that in this view goes vertically up from the road and through to the peak—is cleanly worked.

5 Use a knife to clean up the sides and to deepen the stop-cut that defines the depth and shape of the camber.

6 The incised cuts are best worked with three strokes: one stop-cut to set in the center line and to establish the depth of the incision, followed up by an angled cut at each side to establish the width of the incision and to remove the waste.

7 Be careful when you are working the top of the small scroll that you don't dig too deeply into what will be end grain.

8 Having used a ruler and square to draw in the center line, do a dry-run fit of the scroll. Establish the position of the screw holes by taking your eye-level down to the face of the wood and identifying the scroll-to-shelf contact points.

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GILDING THE SCROLL BRACKET

Woodworkers are forever coming up with new and exciting ideas. I'm sure you know what I mean. One moment you are hall way through a project, and the next . . . Eureka! A new idea or variation springs to mind. And so it was with this project. The moment I had finished describing how to carve the bracket and give it a lick of gold paint, it suddenly occurred to me that perhaps it would be more in keeping with the wood carving tradition to gild the bracket.

Though gilding is a technique that requires a good deal of time and patience, the end result is stunning, well worth the effort. There are two methods of gilding: oil and water. 1 have opted for what is best described as the shortcut oil technique. That is to say, I follow the whole procedure for the gold painting, and then finish up with the gilding.

THE GILDING PROCEDURE

Give the finished carving a couple of coats of matte white undercoat paint followed by a coat of gold paint, and wait for the paint to dry. Then take a piece of fine-grade sandpaper and rub the carving down to a smooth-to-the-touch finish—the smoother the better.

Being mindful that the oil gold size dries in about 25 minutes, give a small area at the back of the bracket a swift thin coat. When the size is tacky—almost dry—slide one of the gold leaf sheets out onto the plywood and cut it into small postage-stamp pieces. Press straight down with the lull length of the blade.

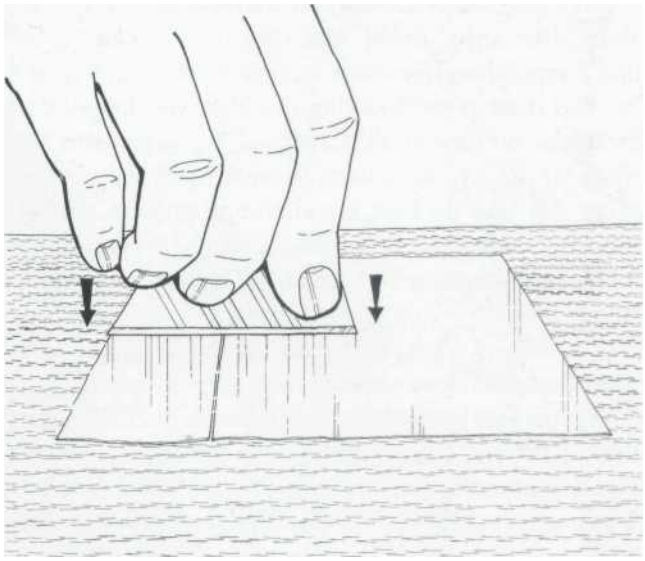
Now for the tricky part! Take the brush or tip, pass it a couple of times over your hair to increase the static, and then touch it down so that it picks up a small piece of gold leaf. Lay the gold leaf down onto the tacky size and dab it into place with a pad of lint-free cotton cloth. Take up the second piece of gold leaf and lay it down alongside the first so that there is a slight overlap. Continue until the whole surface of the bracket is covered in gold.

Finally, dust the surface with a dry brush to remove loose pieces of gold, and the job is done.

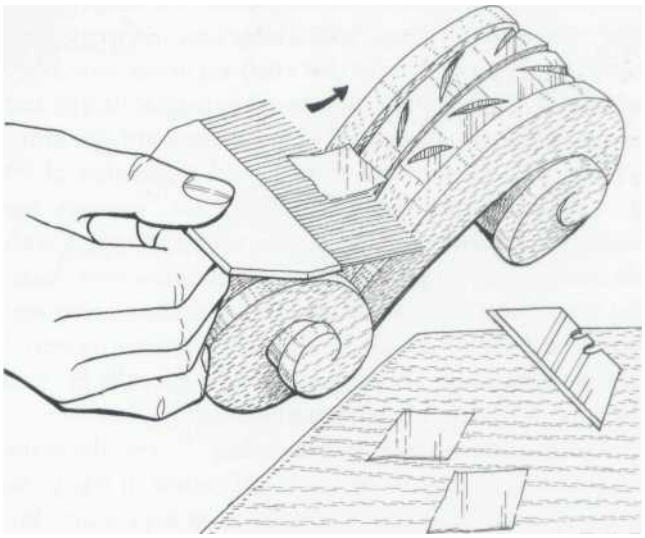
MATERIALS LIST: OPTION

A Quick-drying oil gold size
B 25-leaf book of gold leaf—or metal leaf (imitation gold) at a quarter of the price
C Gilder's brush or tip
D Craft knife blade
E Piece of easy-to-hold plywood (12″×12″)

STEP-BY-STEP STAGES



1 Having made sure that everything is clean, dry and free from dust—your hands, the blade and the plywood—take the blade and press the whole length of the cutting edge down hard on the gold leaf. Make the cut by slightly rocking the blade.



2 Wipe the brush over your hair to increase the static, then swiftly pick up the gold leaf and lay it down on the tacky gold size. Press the leaf down with a clean cotton pad.

COMBINATION AND MULTIPLANES

I don't like routers. Okay, so maybe they are the best thing since sliced bread. Yes, they do a wonderful job, and 1 agree that they aren't as expensive as they used to be, and there is no doubting that they get the job done in almost no time at all. I know all the arguments. The thing is, I don't like routers because of all the dust and noise. But how do I cut my moldings, grooves, tongues, rounds, hollows and all the other profiles? Well, the beautifully simple answer is, 1 use an old Stanley 45 combination plane.

The Stanley 45 is, to my way of thinking, one of the most beautiful woodworking tools ever invented.

It came into being at the end of the nineteenth century, when there was a huge push by the iron plane manufacturers to come up with a single do-it-all plane. You have to remember that up until that time, every type and size of slot, tongue, fillet and fancy profile needed to be worked with a dedicated plane. Can you imagine? If you were a keen woodworker in the nineteenth century, it's likely you would have needed 40 to 50 or more different wooden moulding planes!

The Stanley 45 is a quality tool, more like a hand-built gun than a plane. It has a main body piece with a sledge-skate sole runner and a rosewood handle; a cutter clamp and integral depth gauge with a large knurled wheel; two nickel steel outrigger arms that are fixed to the main body with screws; a middle section with an integral handle and sledge-skate sole runner that fits onto the outrigger arms; a fence with a rosewood runner; and a selection of 45 plus cutting irons. And as if all that isn't enough, my Stanley 45 is covered in fancy caste motifs; dripping with chrome and nickel plate; heavy with thumbscrews, locking nuts, wing nuts, adjusting screws, cutting spurs and knobs; and supplied with the set of cutting irons packaged in a wooden wallet. Better yet, the whole works fits into the most attractive tin presentation box.

And just in case you are wondering . . . yes, the plane does indeed live up to its looks. Of course, it has to be carefully tuned and the irons need to be kept sharp, but that said, it is a most efficient tool.

Setting up the Plane

As to why Stanley stopped making the "45" way back in the 1960s, who can say. They are still being sought by today's woodworkers, and though they are relatively easy to obtain, the main problem is that most secondhand 45's come disassembled and without the necessary setting, tuning and using instructions.

And just in case you are one of the growing army of avid user-collectors who have a secondhand Stanley 45, and would dearly like to know how it needs to be sorted and tuned, then help is at hand.

STANLEY COMBINATION PLANE
The legendary Stanley 45 *in action.*

The order of setting up or tuning—the way I do it—is as follows. I first select a cutting iron and check that the edge is clean and well honed. If necessary, I wipe it on the oilstone and use a slipstone and a strop to bring the cutter bevel to a razor-sharp, 35° edge. This done, I fit the cutting iron into the groove and adjust the wing nut so that the iron is held in position. Next, I slide the middle sole runner on the outrigger arms and slide it up to the body of the plane so that the blade has a runner at each side edge. If I am going to cut across the run of the grain, I set the spurs so that the little cutter or nicker blade is in the down position. Lastly, I measure and set the fence and the plane is ready for action.

Okay, the plane is well set up and tuned, you have a nice straight-grained piece of wood in the vise, and you are ready to go. The first thing to do is get a household candle and wipe it over the sole and fence of the plane. Certainly it sounds a bit strange, but a couple strokes with the candle will dramatically reduce the friction—it will just about cut your sweat by half. And just in case you don't believe me, try it without the candle—ha!

When you are ready to go, with the depth gauge set, set the runners down on the workpiece so that the fence is hanging over the side edge of the workpiece. Clench that fence hard up against the side edge, and then take repeated passes until the groove, tongue or profile is cut. The best procedure is to start at the end of the wood furthest away from you, and then gradually back up. Of course, you might need to adjust the depth of cut, but if you have it all together, with the plane nicely tuned and set up, the rest is easy.

As 1 said at the beginning, the Stanley 45 is a beautiful tool: no dust, no deafening noise, no need for a mask or ear plugs, no motors or dangling cables. Just a sweet slickkk ... slickkk . . . as the paper-thin shavings curl up.

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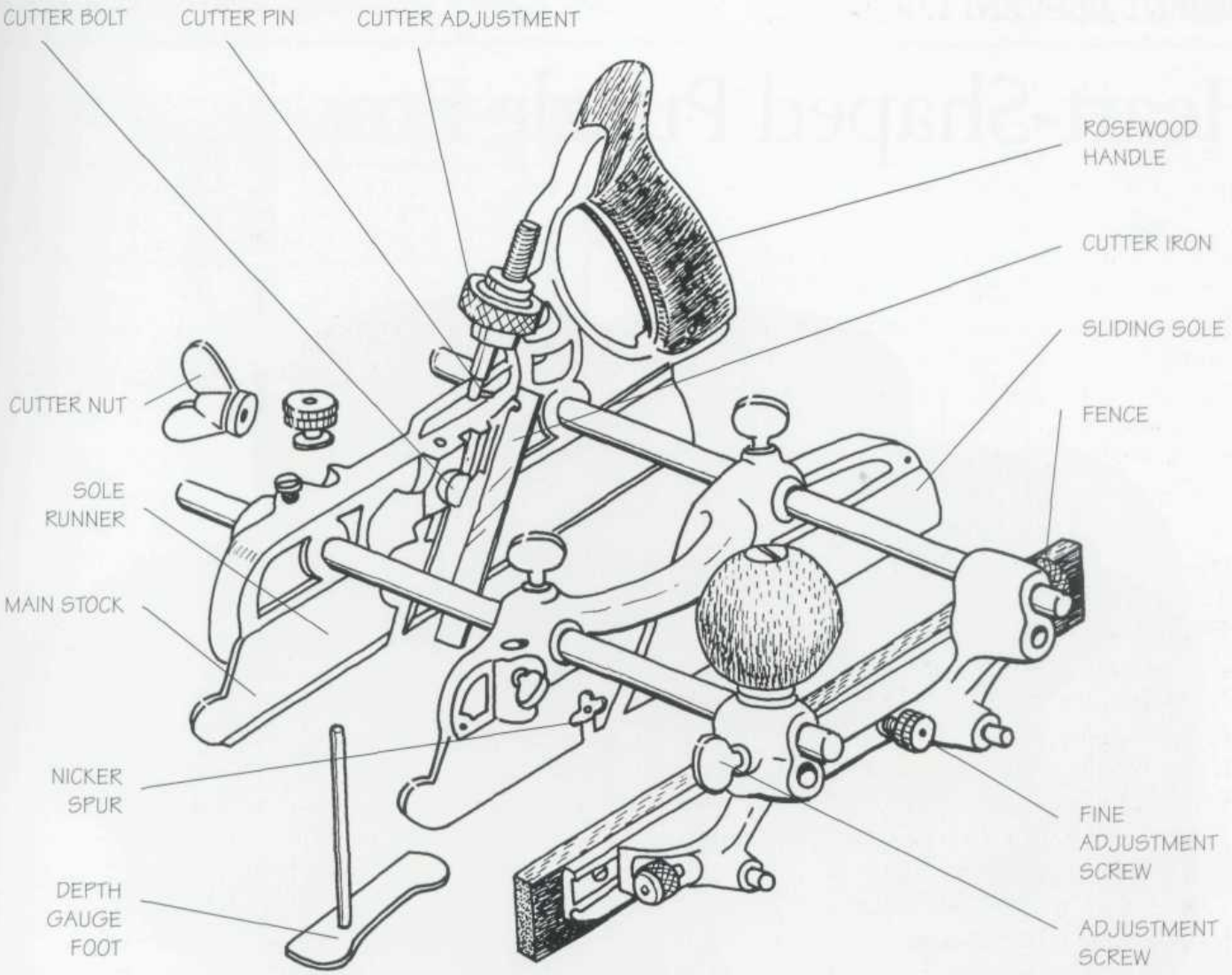

STANLEY PLANE ANATOMY

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Heart-Shaped Puzzle Box

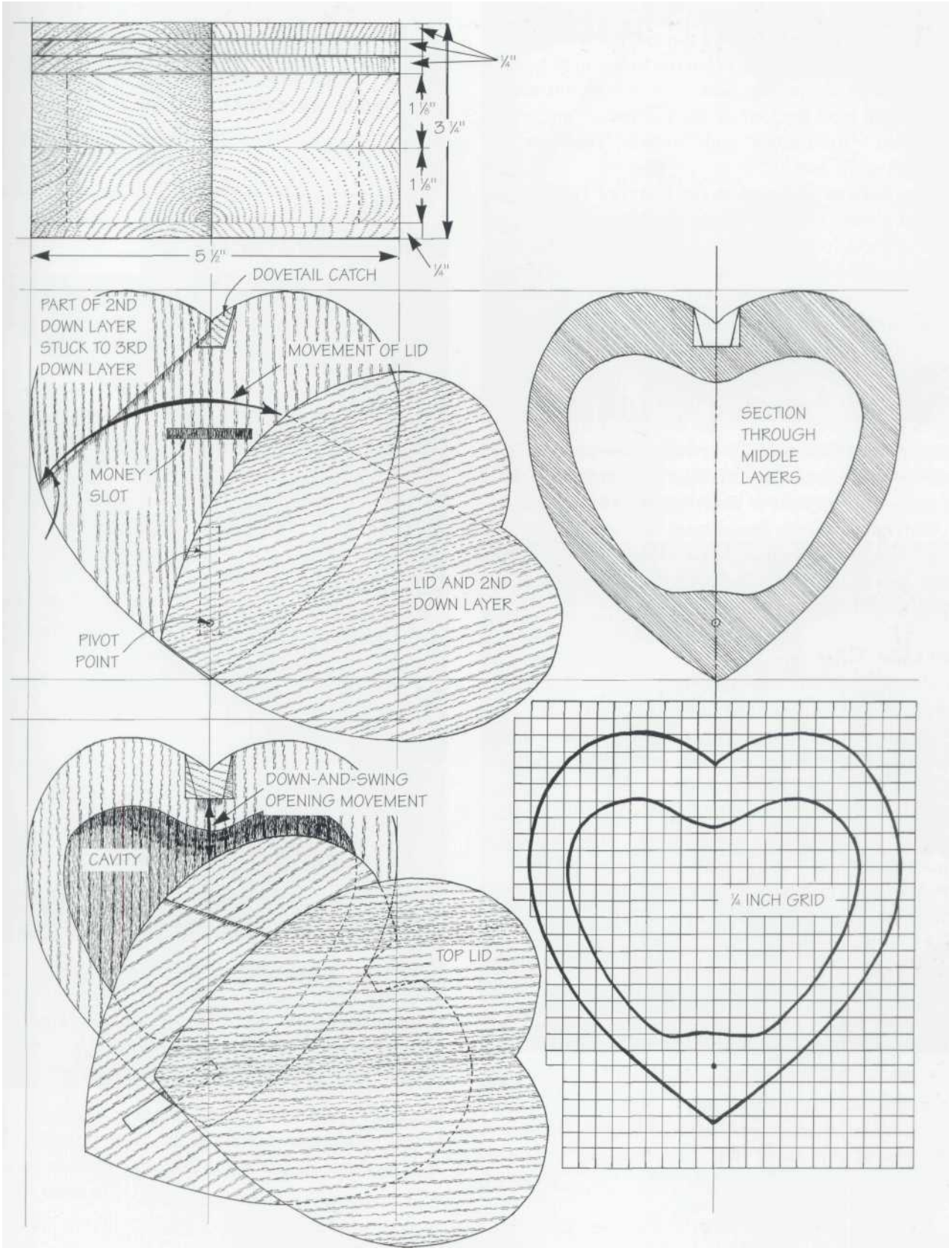
When I was a kid, an old woman left me a small wooden box in her will. The funny thing was that, although it appeared to be just an ordinary empty box with a small division to one side, when I shook it, it rattled. After variously pushing, pressing and sliding the sides and base of the box, I discovered that it had a secret compartment! It was very exciting. When I pressed down on one side of the bottom inside of the box, I was able to slide up one side of the little division to reveal a secret space. As for the rattling noise, it was a solid gold half sovereign!

This project draws its inspiration from that old wooden box. It has all the same elements: a secret area, a sliding lid, and a part that swivels open.

MAKING THE BOX

First things first, you must have a good long look at the working drawings and see how the box works. Of course, like all such boxes, it's pretty easy when you know how. To open the box, swivel the lid to the right to reveal the coin slot and the top of the dovetail key. Then, at the same time, slide and swivel the coin slot face of the box down and around to reveal the inside compartment.

When you have studied the design, draw out the heart shape. Make a tracing. Pencil press transfer the traced lines through to the layers of wood that go to make up the box. You need six layers in all: four at 1/4" thick and two at 1 1/8". Fret the shapes out on the scroll saw, so that they are all slightly oversize—meaning that the line of cut



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is about 1/8″ to the waste side of the drawn line. While you are at **it,** cut out the inside-box area.

Glue the two 1 1/8" layers together and use a gouge to pare the inside of the box to a clean finish. Next, use a fine saw and chisel to pare a channel from top to bottom of the box (at top-middle, where the two cheeks meet). Now, pencil label the four 1/4"-thick cutouts: "top," "second down," "third down" and "bottom." Then glue the "bottom" to the box.

Glue the rod of wood in the channel and cut the dovetail shape. This done, take the "third down" layer and cut the two slots and the dovetail location notch. When you are happy with the fit, take the "second down" layer, set the scroll saw cutting table at an angle, and run the wood through the saw to cut the miter across the top-left cheek.

When you have made all the component parts, then comes the not-so-easy part of putting the box together. The best procedure is to first fix the slotted layer and the bottom half of the mitered layer with a swivel screw. Then glue the two halves of the mitered layer together. Finish by gluing the lop layer to cover up the swivel screw.

Certainly it sounds complicated but, in fact, you will have it worked out in much less time than it lakes to tell. Finally, you rub it down with the graded sandpapers and seal with Danish oil.

SPECIAL TIP

The secret of getting this box right has to do with the standard of the finishing and fitting. All the surfaces must be rubbed down to a super-smooth finish, especially the mating faces that are to be glued and the laces that are to slide over each other. As to the final gluing, the best procedure is to start off using double-sided sticky tape, and then use the glue for real when you know how it all goes together. 1 say this because it is the easiest thing in the world to make a complete mess-up by gluing the wrong two parts together. Be warned!

MATERIALS LIST

A Board (6)	¼″×6″×7″—I used English yew throughout

HARDWARE AND EXTRAS

Swivel screw (1)	1¼″-long brass countersunk screw

STEP-BY-STEP STAGES

1 Detail showing how the square rod fits in the channel so that the dovetail at the top locates in the slotted layer. The procedure is to first glue and fit the rod, then cut the dovetail.

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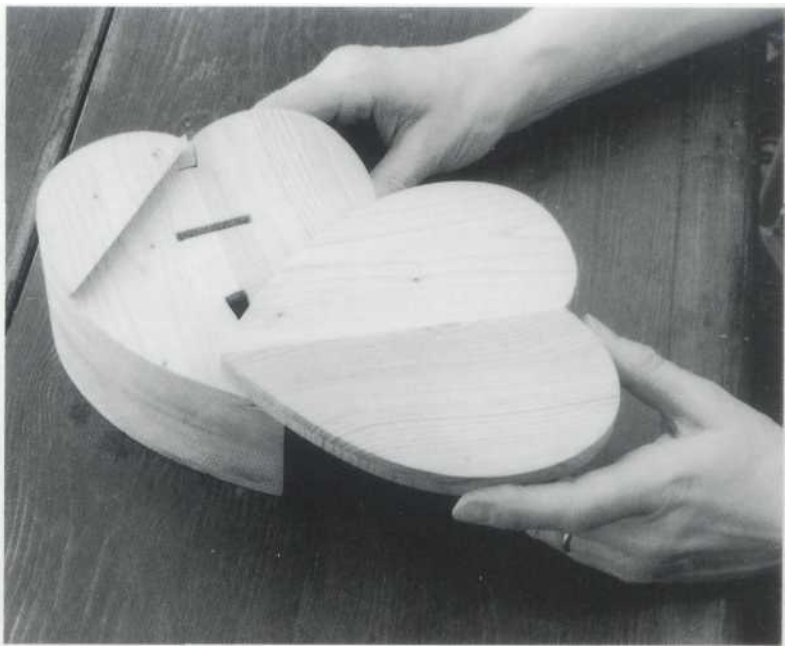
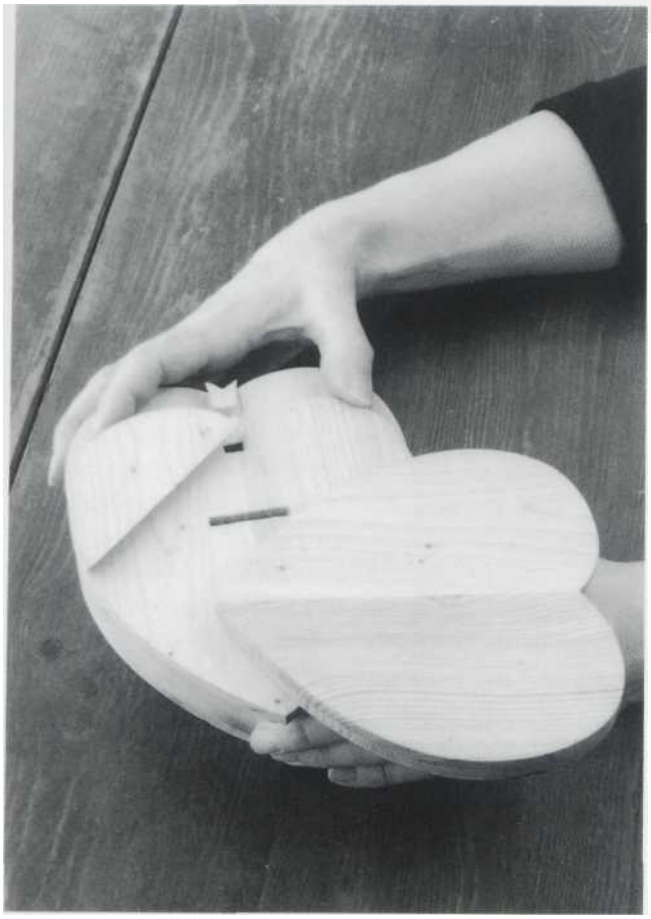
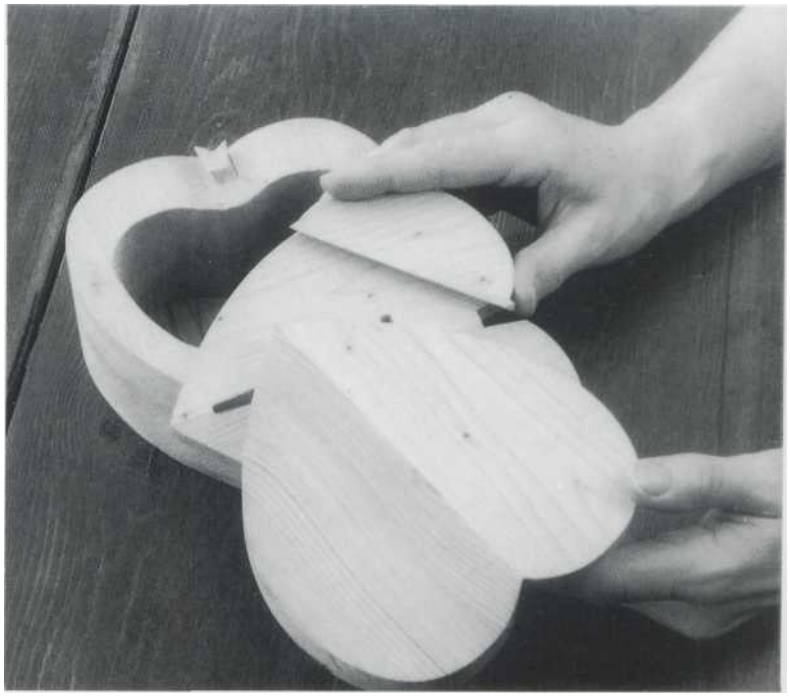
2 The miter cut on the second layer needs to be angled so that it looks toward the bottom of the heart. Be mindful that the finer the saw used to make the cut, the better the fit.



3 See how the top-left part of the mitered layer needs to be glued to the slotted layer, so that the topmost part of the miter hangs clear of the dovetail.



4 The pivot slot on the third layer needs to be adjusted so that the layer can be slid down and then swung over—so that the "cheeks" at the top of the heart just clear the dovetail.



5 In my design, the slotted layer is able to swing to the left or right. If you want to make the box more of a puzzle, a good modification would be to build in a little "stop" peg so that the layer could only be swung to the left.

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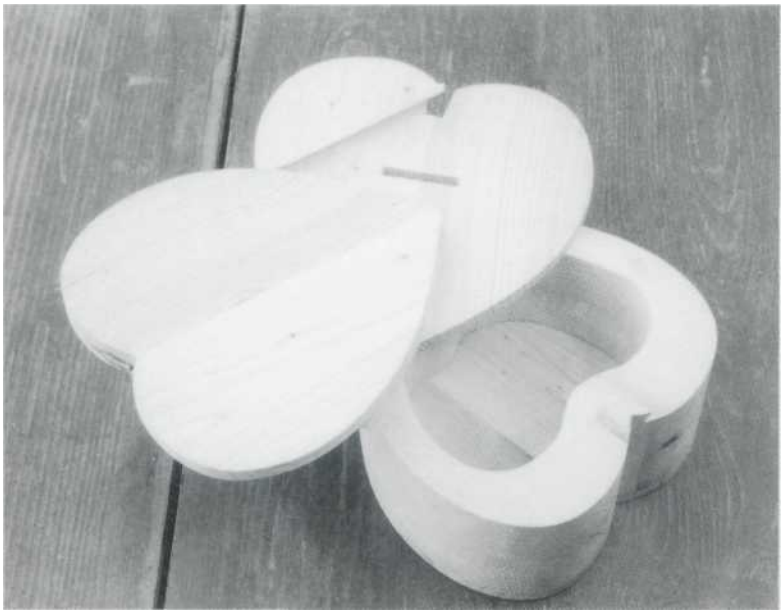
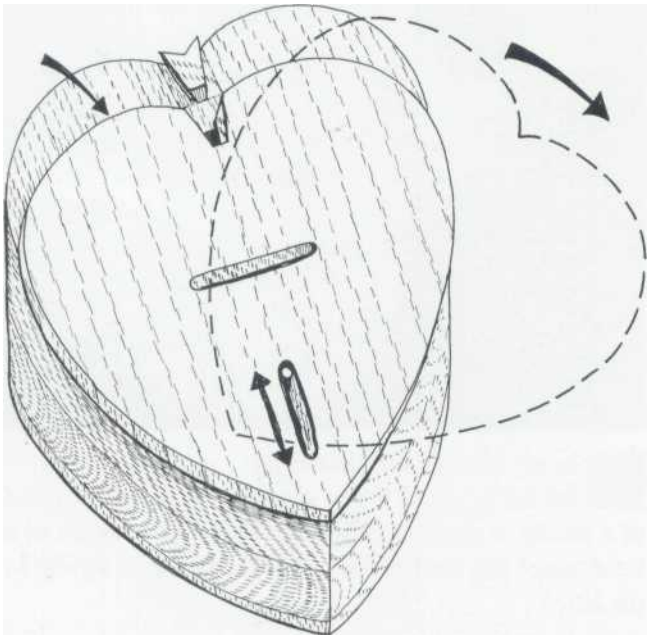


TWEAKING THE DESIGN

When you are fixing the swivel point and the slot, make sure that the slot is long enough for the cheeks to clear the underside of the dovetail.

6 Because I had quite a lot of trouble cutting out the center of the box—first with the drills and then with a gouge I think the next lime around 1 will redesign the dovetail post so that it cuts right through the wall of the box. Then 1 can more easily clear the inside-box waste on my fine-bladed band saw.



PROTOTYPES

A prototype is a full-size working model that is made prior to the project. The idea is to use inexpensive materials to work out all the problems before you start using your precious materials.

As you can imagine, this heart-shaped box didn't drop from the sky perfect and ready-made—no way! In **fact,** it was rather difficult to sort out. Although the various views and cross sections looked fine on paper, I just couldn't figure out how the three layers that make the top of the box fit great together. In the end, after a deal of swearing and messing about, 1 decided that the best way was to make a full-size prototype from three pieces of 1/4"-thick hardboard.

The working procedure went as follows: First I cut out the three heart shapes and pencil labelled them "1," "2" and "3." Then I drew the heart shape out on the bench. Next, I took cutout number 3 and played around on the drawn-out heart with various placings of the swivel point and the sliding slot.

The main difficulty I found was positioning the miter in such a way that there was enough room for the "cheeks" of the heart to slide open.

When I had established the precise position of the swivel point and the length of the slot, I then tried out board number 2 and fixed the position of the miter slot. And, of course, when it came to making the box for real, I had the hardboard cutouts to use as templates.

And just in case you are thinking that you are so skilled that you can go straight in and make the toy, the table or whatever, without making a working model, yes, you might well be lucky once or even twice. But sooner or later you are going to make a mistake with one or all parts getting incorrectly cut and/or glued.

For example: I once designed the most beautiful chair. It looked wonderful on paper; the drawn elevations were a work of art! But when it was built, it was unstable, it was grossly uncomfortable, and it started to pull apart. Another time, 1 made a moving toy that looked good on paper, but when 1 made it full size, the friction between the wheels and the floor was so great that it simply didn't work.

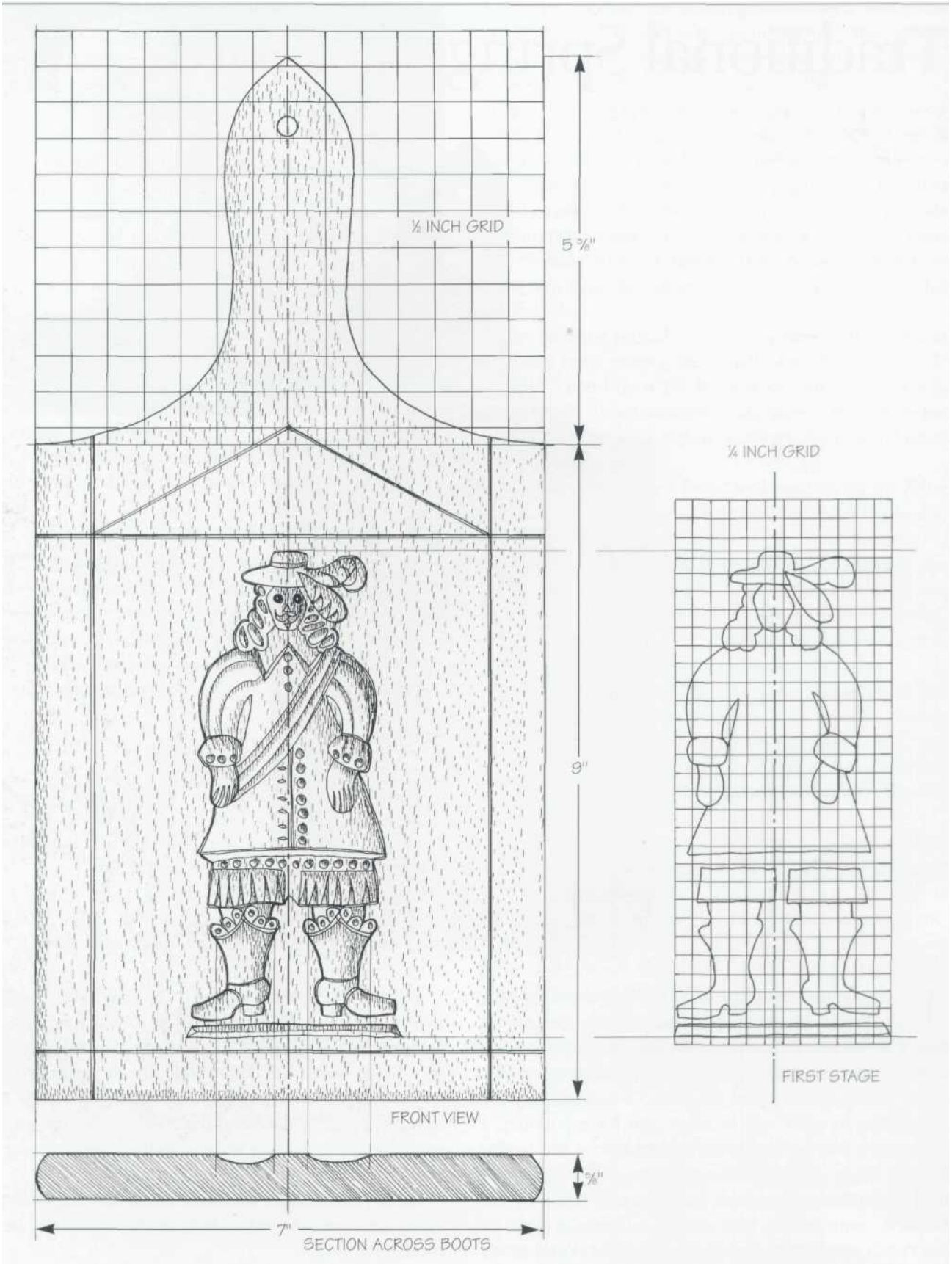
All this is to say that the only sure way of knowing that a design is going to work is to make a full-size working model.

Traditional Springerle Board

The American Colonial kitchen or "keeping room" was an absolute treasury of fine woodwork. There were butter bowls and salt trays, boxes and knife racks, pipe-shelves, cutting boards, tables and chairs, all of them variously carved, pierced and detailed. Of course, they are all exciting in some way or other, but for my money, I particularly like the beautifully carved biscuit and cookie boards. There were shortcake molds made by the English and Scottish communities, breadboards made by the Swedish communities, little stamps and presses made by the Polish immigrants. Just about every Old World group had a unique style, form and tradition of carved boards.

Of all these "mother country" woodenwares, the German American Springerle cookie boards are perhaps the most delicate and fanciful. Every early Pennsylvania German home had them. The cookie dough was rolled thin and the carved hardwood board was pressed onto it to imprint the designs. When the cookies were baked, the resultant raised designs and motifs made an attractive table arrangement.

So if you like the notion of basic carving, and you know someone who enjoys baking, then this could be the project for you.


½ INCH GRID
5 ⅞"
9"
FRONT VIEW
⅝"
7"
SECTION ACROSS BOOTS
¼ INCH GRID
FIRST STAGE

MAKING THE SPRINGERLE BOARD

This is the perfect project for nervous beginners who are looking for an easy way into the craft of woodcarving. All you need is a flat board, a bench clamp or holdfast, a V-section gouge, a straight gouge, a small spoon gouge, a sharp knife and a steel safety ruler, and you are ready to begin.

Trace the design on a slab of well-prepared, close-grained hardwood. We have chosen beech, but you could just as well go for plum, pear, sycamore or maple. Then carefully pencil-press transfer the primary lines of the design through to the wood. Next, cut out the shape of the board on a scroll saw and rub the edges down to a good finish. This done, secure the workpiece flat-down with the clamps or holdfast and use the spoon bit tool to scoop out the primary elements of the design. Don't try for any great depth, just settle for nice round depressions. It's all pretty easy, as long as you are careful that the tool doesn't dig too deeply into the gram and/or skid across the wood. Continue working with a controlled action, holding and guiding the tool with one hand and pushing, scooping and maneuvering with the other until you have achieved what you consider is a good strong design. You need to dish out the hat, the hair, the face, the coat and cuffs, and the boots. Being mindful that the design is in reverse, try to judge the depth of the carving so that the fullest part of the design has the deepest hollows. Aim to scoop out the little dips and hollows to a depth of about 1/4". Don't dig the tool too deep or try to lever the tool, but rather work with a delicate scooping and paring action. Cut across the grain wherever possible. Remove only small curls of wood and try to keep the carving crisp and controlled. If you feel at any time that the tool is cutting roughly, then approach the grain from another angle or sharpen the tool with a few strokes on the stone and leather. Bear in mind that each and every hollow needs to be worked smoothly—no rough surfaces or undercuts. It's a good idea from time to time to test out your carving by taking a piece of Plasticine and pressing it into the cut shapes, just as if you were pressing dough on the board. Once you have considered the shape and detail of the pressing, you can adjust your work accordingly. Ask yourself as you are working, could the little dips be deeper? are the shapes nicely rounded? and so on.

With the basic pattern in place, take the very smallest spoon gouge and scoop out the little dips that go to make up the small dot and dash details of the buttons and eyes.

Next, use your knives to cut in the fine details. For example, you need to cut in the features, the sash and belt, the tassels around the top of the boots, and so on. And of course, if at any time along the way you want to cut in pockets or bigger plumes or other details, then follow your fancies. Finally, use the knife *or* V-tool to cut in the simple frame shape.

MATERIALS LIST

A Board (1)	5/8″×7″×15″—a piece of prepared wood like beech is best

Note that all measurements allow for a small amount of cutting waste.

STEP-BY-STEP STAGES

1 Go over the transferred lines with a soft pencil and then spray with pencil fixative to prevent

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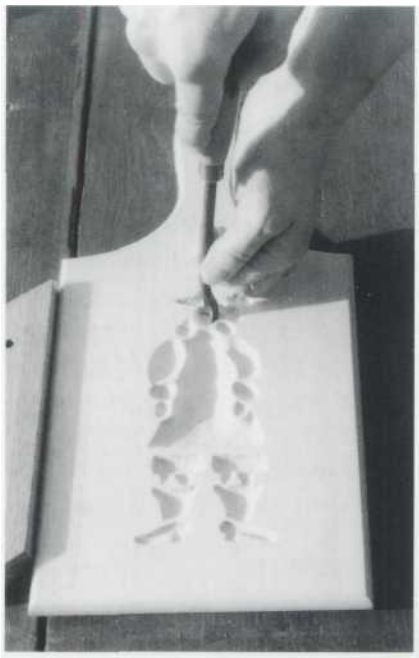
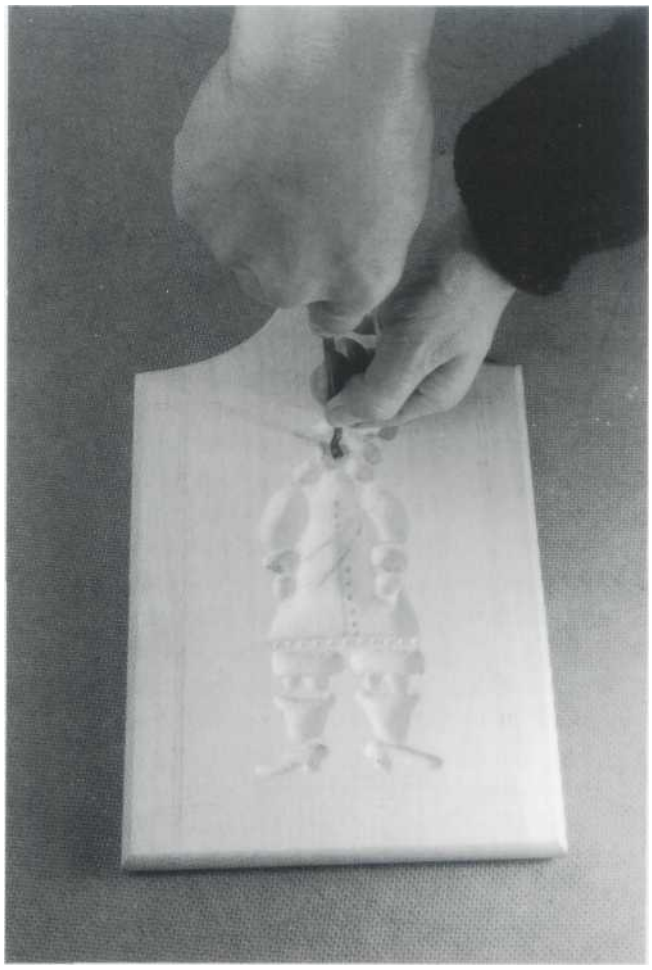


2 Use one of your spoon bent gouges to scoop out all the little hollows and depressions that will make up the design.

3 If the shape of the depression permits, cease with the spoon bit and change to using the straight gouge. You will find that the straight tool allows you to get a bit more weight behind the thrust.



4 Use the smallest spoon bit gouge to "winkle" out the small dot-and-dash details of the eyes and trim. Stab the tool down vertically and twist it on the spot so that it "drills" out a pocket of waste.

SPECIAL TIP

If you find that your tools are cutting roughly, the chances are that the wood is damp or unsuitable or the tools are blunt and need sharpening. The best way to work is to set yourself a rhythm. That is, spend a lew minutes carving and a few minutes standing back and assessing your progress, and then a few minutes rubbing the bevel of the knife or chisel on the fine stone, and so on. If you do this, the work will move along smoothly, with the carving being nicely considered and the tools kept at maximum sharpness.

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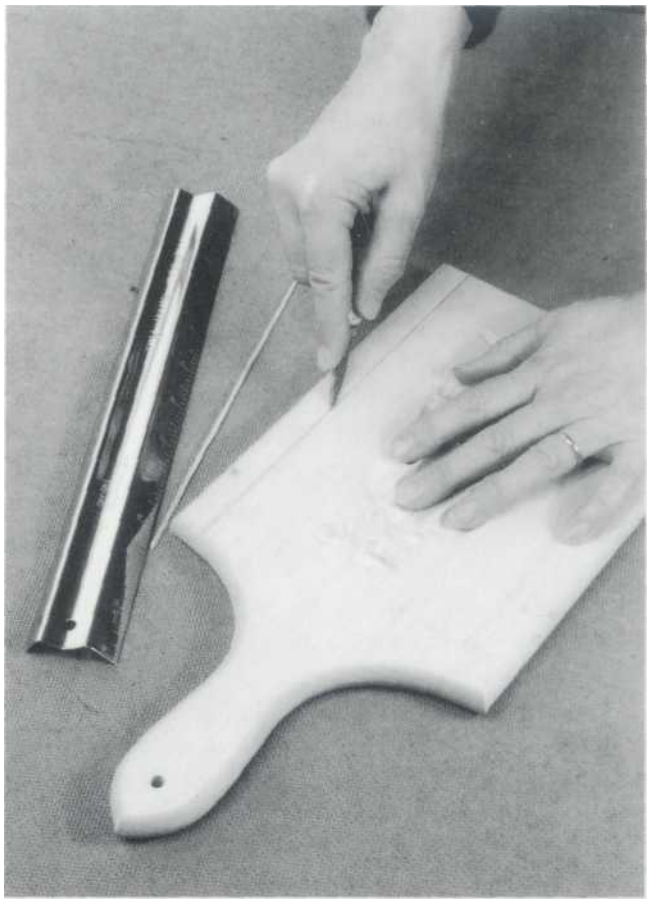
5 Use the knife to cut the tassel details. Make three cuts for each tassel—a deep stabbing horizontal stop-cut to define the width of the tassel, followed by two downstrokes to clear the waste from the triangular pocket.



6 Use the steel safety ruler and the knife to cut the V-section frame detail. Each line is made with three cuts—a single straight-down stop-cut to define the depth of the V, followed by two angled cuts to clear the waste.

CHOOSING AND USING WOODCARVING TOOLS

There are so many woodcarving tools on the market that beginners are often bewildered when it comes to buying gouges and chisels. For example, I have just looked through a handful of current catalogs and I see hundreds of slightly different tools to choose from. Maybe you aren't going to need more than a handful of tools, but the big problem is which ones to buy.

The first question you have to ask yourself is what do you have in mind to carve? Are you excited about the notion of carving huge sculptural pieces? Or do you fancy caning intricate little birds? Or do you just want to try your hand at traditional flatwork like chip or relief carving, the sort of carving that you see on furniture?

When you decide on your area of woodcarving—sculptural, relief designs, miniatures or whatever—it's best to buy a modest starter kit of, say, four tools. For example, you might get a couple of straight gouges, a V-tool and a bent gouge. Of course, once you actually start carving, the whole problem sorts itself out. You will soon discover that certain tricky details simply cannot be worked, or that you can't carve an undercut or some other detail with any one of your four tools. Then you have enough knowledge to buy a tool of a shape and size to suit. When I first started carving, my favorite tool was a medium-size, shallow-curve straight gouge—it still gets used more than any other tool. So you might start out with the four tools, and everything will be fine and dandy, until the time comes when you need to use a fishtail or a smaller spoon gouge, or yet another size straight gouge .. . and so the fun begins.

All that said, the single thing that bothers most beginners is that they are confused when it comes to the names and the numbers of woodcarving tools. If you don't know what I mean, look at various woodcarving tool catalogs.

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From one manufacturer to another, there are all manner of descriptions that relate to the same tool types. Some manufacturers use letters and numbers, some use their own prefix codes, and so forth.

If you are a beginner and still undecided as to the correct gouges for your starter kit, then try the following method—it may help. Start by determining the width of blade you need. Let's say that you have chosen a *V2"* width. Next, consider the hollow or sweep of the blade. Ask yourself, do you want a shallow sweep or do you want a deep U-section sweep for bowls and such? Finally, decide on the profile or shape of the blade along its length. For example, do you want a straight blade or a curved or spoon bent? Once you have sorted out the blade width, the shape of the sweep and the profile of the blade, then all you do is walk into the store and point a finger.

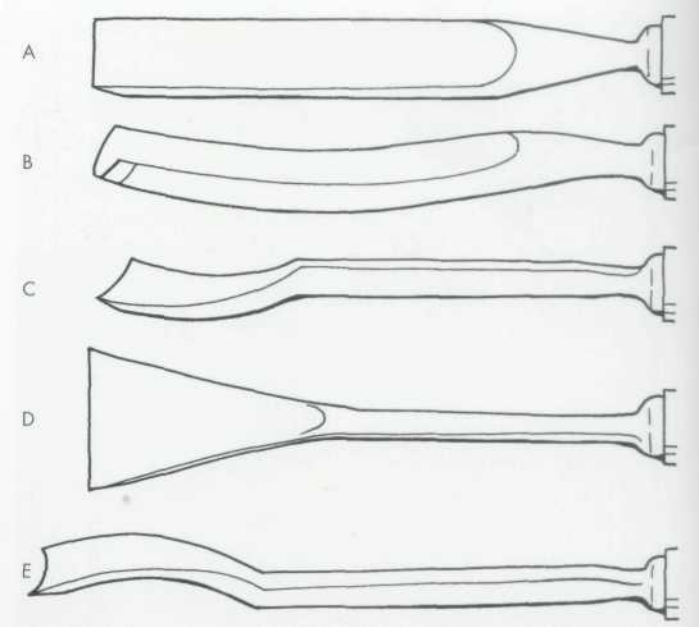
STRAIGHT CHISELS AND GOUGES

If you are still confused as to terms, the following glossary will show you the way.

Straight Chisel—A straight chisel is a flat-bladed tool that has a straight cutting edge. If you jab the cutting edge into the wood, it will leave a straight cut, like a dash. The term "straight" relates to the shape of the blade along its length. The size of the chisel is determined by the width of the cutting edge. In use, the chisel is held in one hand and then either pushed or struck with a mallet. ***Straight Gouge***—Though the straight gouge is straight along its length—just like the straight chisel—the blade is hollow-curved in cross section. If you stab a gouge into the wood, it makes a curved cut, like a C or U. The shape of the curve is termed the "sweep." So when you are ordering a gouge, you need to know the width of the blade and the shape of the sweep. In use, the straight gouge is either pushed by hand or struck with a mallet.

CURVED OR BENT CHISELS AND GOUGES

Having established that the term "straight" describes the shape of the blade along its length, it follows that the terms "curved" or "bent" also describe the blade along its length. For example, you might have two gouges that make identical cuts, the only difference being that one is straight along its length and the other curved or bent. They make the same cut, but the bent tool allows you to hook and scoop into hollows that the straight tool is unable to reach. Spoon bent, fishtail and back-bent tools are simply gouges that are more extremely shaped along their length. So, if you want the cutting edge of your gouge to be a certain width and sweep, you have to make a decision as to the shape of the blade along its length. Do you want a straight blade for heavy pushing or mallet work, a bent one for digging out a shallow bowl, a spoon shape for scooping out deep hollows, or a fishtail for cleaning out tight corners?



CURVED OR BENT CHISELS AND GOUGES

(A) *Straight chisel; (B) deep sweep curved gouge; (C)* shallow *sweep spoon bent gouge; (D) shallow sweep fishtail gouge; (E) shallow sweep backbent gouge.*

Handles—Once you have decided on the width of the blade, the size of the sweep—meaning the shape of the C section—and the shape of the blade along its length, then comes the choice of the handle. There are turned hardwood handles, plastic handles, handles with and without ferrules, and so on. I personally prefer the "London" pattern of turned and shaped octagonal boxwood handles on three counts. They are comfortable to hold, they look good, and best of all, the octagonal section prevents the tool rolling about or falling off the bench and doing damage.

Nautical Clock and Weather Station

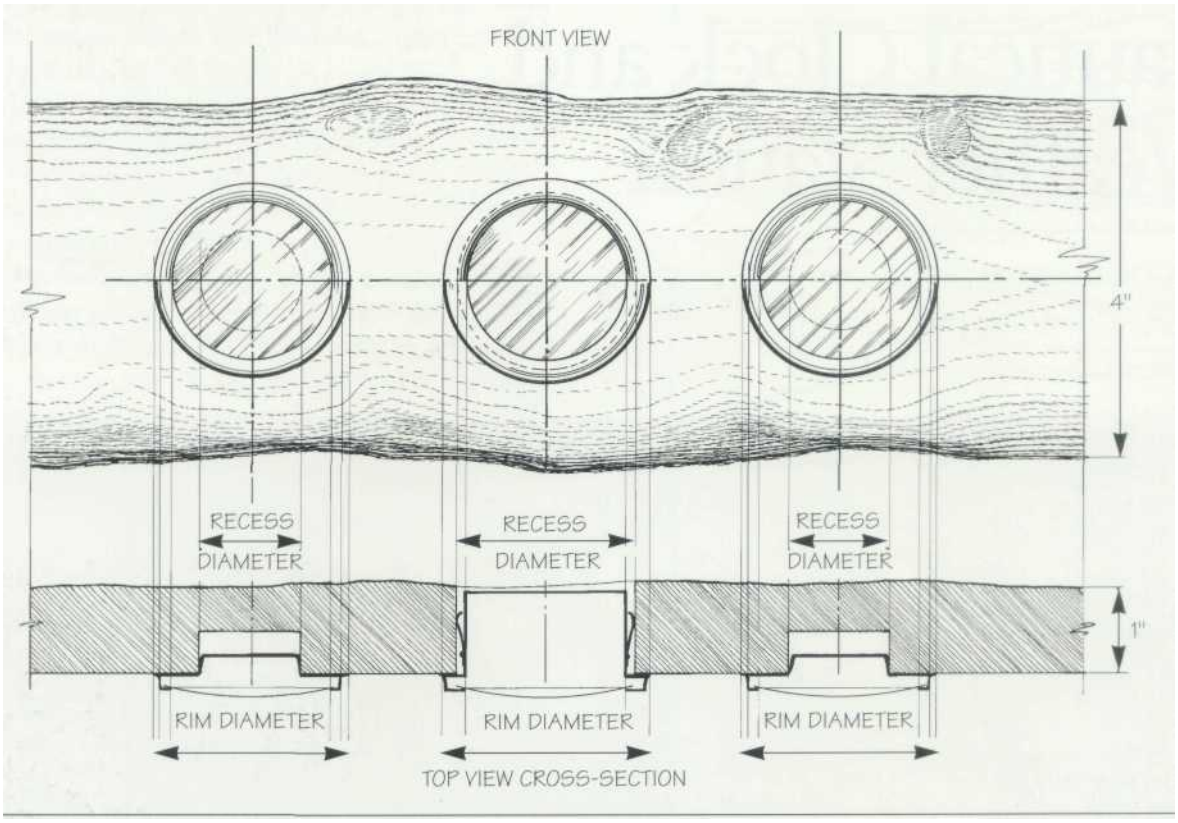
When we decided to move from a wild and windy part of the coast to a relatively mild hills-and-dales part of the country, we felt that we wanted to take a lasting memento with us. As we both love the sea, we felt that we wanted a reminder of our wonderful walks along the rugged cliffs, of the picnics on the lonely beaches, and of the exciting times we had with our many boats. After a great deal of thought that took in such notions as collecting sea shells and the like, it suddenly came to us. Why not take a piece of driftwood—perhaps part of an old boat—and turn it into a nautical clock and weather station? To our way of thinking, the whole project would be a lasting memento . . . of the beaches, the storms that smashed up the boats, and the constant need to keep one eye on the time, tide and weather.

So if you, too, want to make a memento gift that uses a piece of found wood, then this is a great project.

The wonderful thing about a design of this size, type and character is its flexibility. There are any number of amazingly exciting options. I say this because, as soon as I had made the sculpted and weathered board, Gill came up with the beautiful idea of using one of our old moulding planes to create a classic moulded board. Her thinking was that there must be thousands of woodworkers out there who own an old plane and are just looking for an excuse to tune it up and get started! She also had the bright idea that with a more formal board, the various instruments could be arranged so that the board could be mounted vertically or horizontally.

MAKING THE FOUND WOOD BOARD

This project is slightly unusual in that your found wood needs the minimum of preparation. Okay, it needs to be clean and the like, but that's about it—no jointing, no



extensive marking out, just three drilled holes and a small amount of planing and sanding. And, of course, there's no reason why your piece of found wood can't be a branch from a special tree, a part of an old house, a piece of wood found in the desert or mountains, or by a river, as long as it has some particular significance.

When you have found your piece of wood, set it down on the bench and consider how the instruments might best be placed. Are you going to settle for the clock, the thermometer and the hygrometer, (see page 73), or are you going to go for additional instruments like a tube barometer or maybe a special tide-time clock? Of course, much depends on the size of your piece of found wood.

Though I wanted three matching brass dials, with a clock having Arabic numerals, I found it impossible to get a good matchup. As you can see, I had to settle for a slightly nasty white-face clock with Roman numerals. Make sure that the instruments you choose are designed to fit into a shallow recess or hole, with the brass surround or rim overlapping the edge of the hole.

When you have decided where the instruments are going to be placed, use a wire brush to scour the grit and grime from the workpiece. If you see some part of the found wood that could be modified in some way, then so much the better. For example, 1 knocked out two rusty old nails and wire brushed the resultant iron-stained holes so that they were big enough to take a piece of found rigging cordage, so that the clock and weather station could be hung on the wall.

Use the wire brush to sculpt the form, to extend and exaggerate the actions of nature. You can make contours that are rounded and rippled, much the same way as the wind, rain, sand and sea scour out the soft part of the grain, so that the hard gram and knots are left standing in relief.

When you have achieved what you consider is a good form, use a plane and sandpaper to prepare a level seating big enough for the instruments. Aim for a flat smooth surface that is slightly bigger than the instruments. Make sure that there are no nails, grit or other matter in the areas that are going to be drilled.

Having cleaned up the seating for the instruments so that it resembles a level plateau, bore the recess holes out with the Forstner bits. Then seal with a coat of varnish and use beeswax to burnish the whole works to a rich sheen finish. Finally, push fit the instruments in the holes, fit the rope or chain, and the project is finished and ready for hanging.

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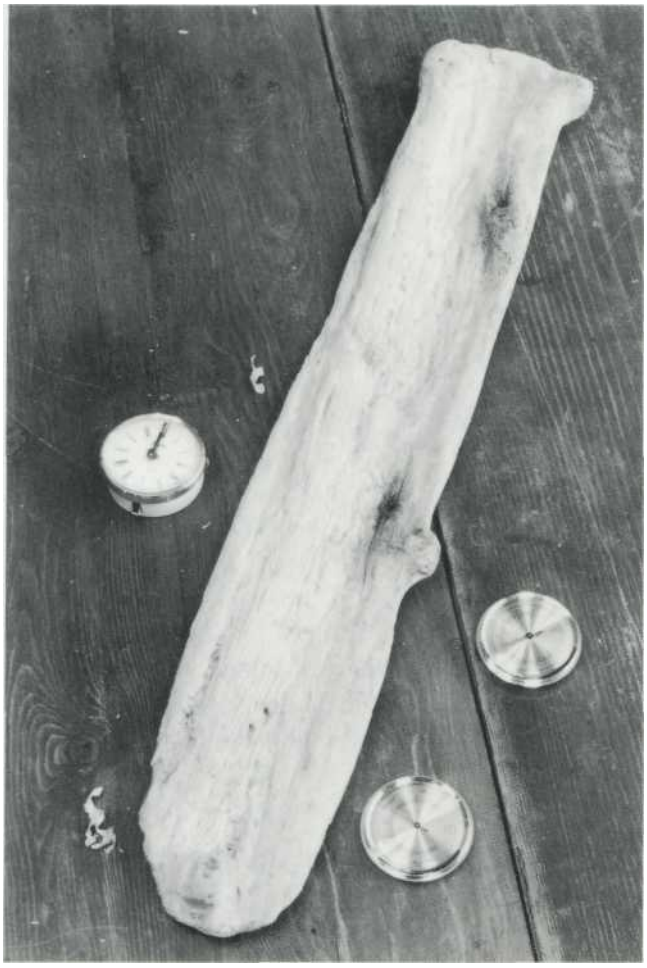
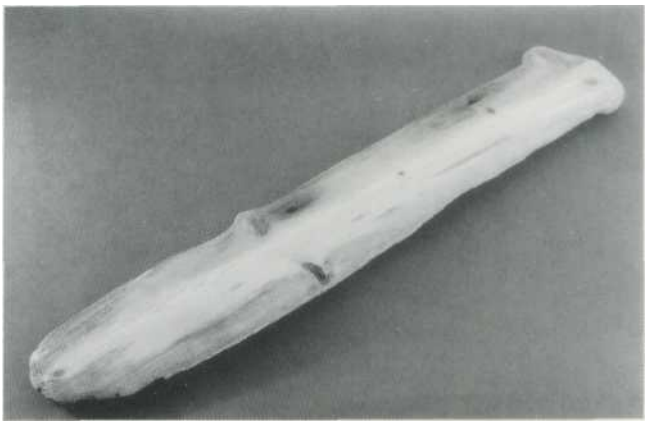
MATERIALS LIST

A Board (1)	A piece of found wood of a size and thickness to suit your instruments.

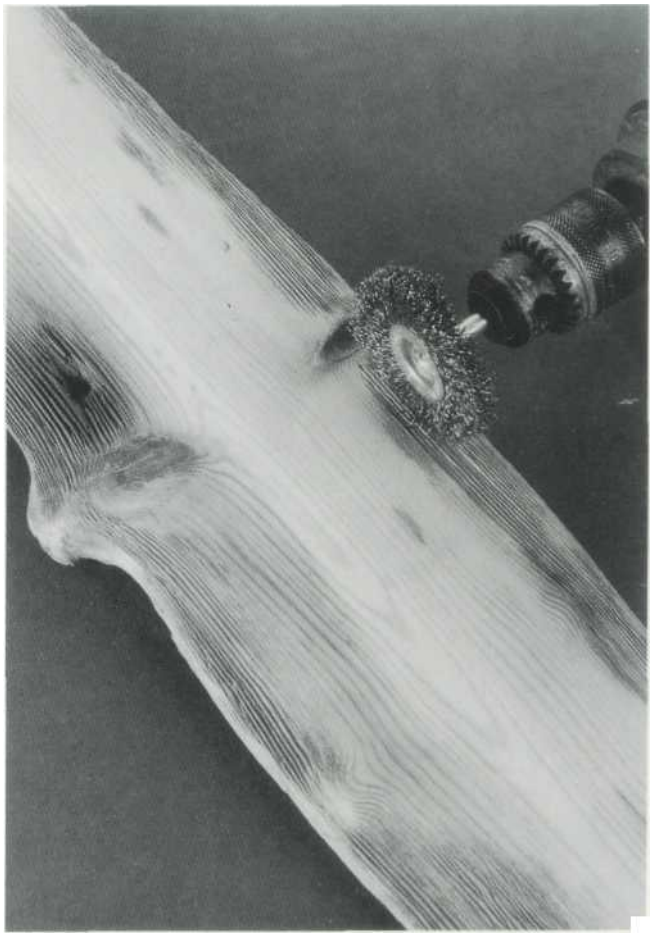
STEP-BY-STEP STAGES



1 Having found your piece of wood, select a set of instruments to fit.



2 Remove the more obvious bits of rubbish—old nails, bits of tar, embedded grit and such. Wipe the wood with a damp cloth and leave it until it is good and dry.



3 Not forgetting to wear gloves and goggles, use a power drill fitted with a wire brush attachment to scour out the loose grain. The safest procedure is to have the workpiece either screwed or clamped to the bench.

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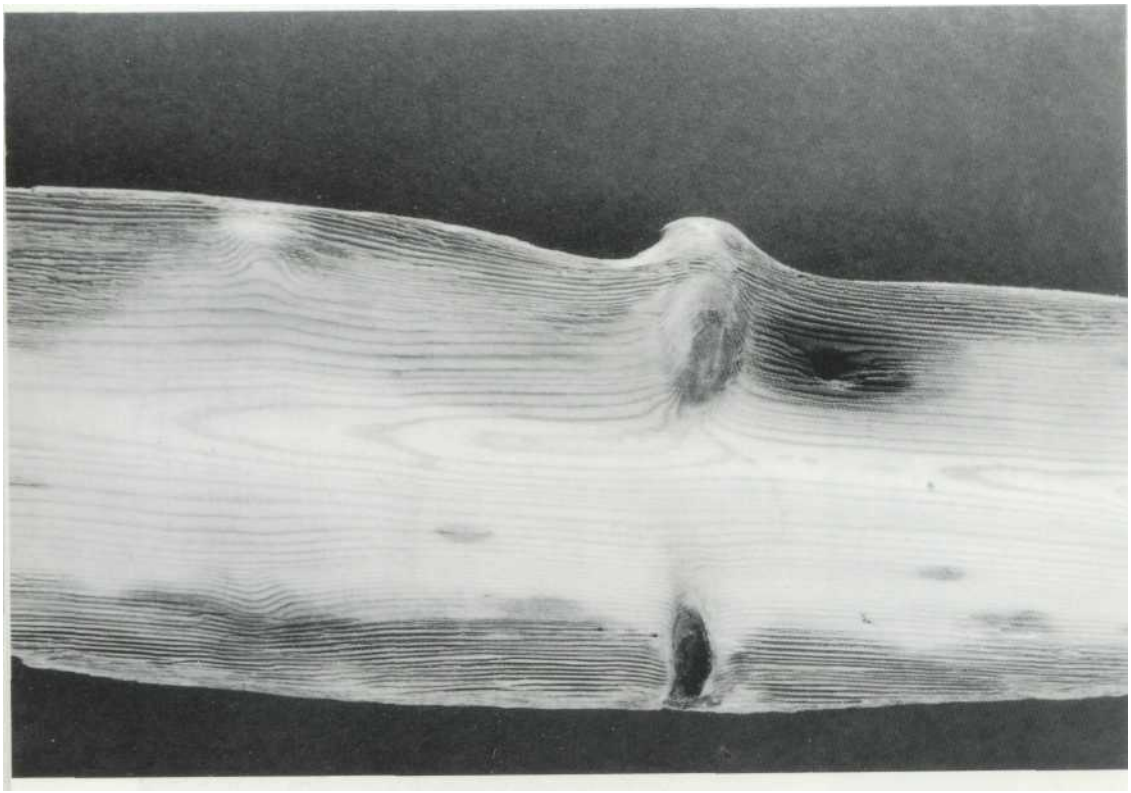
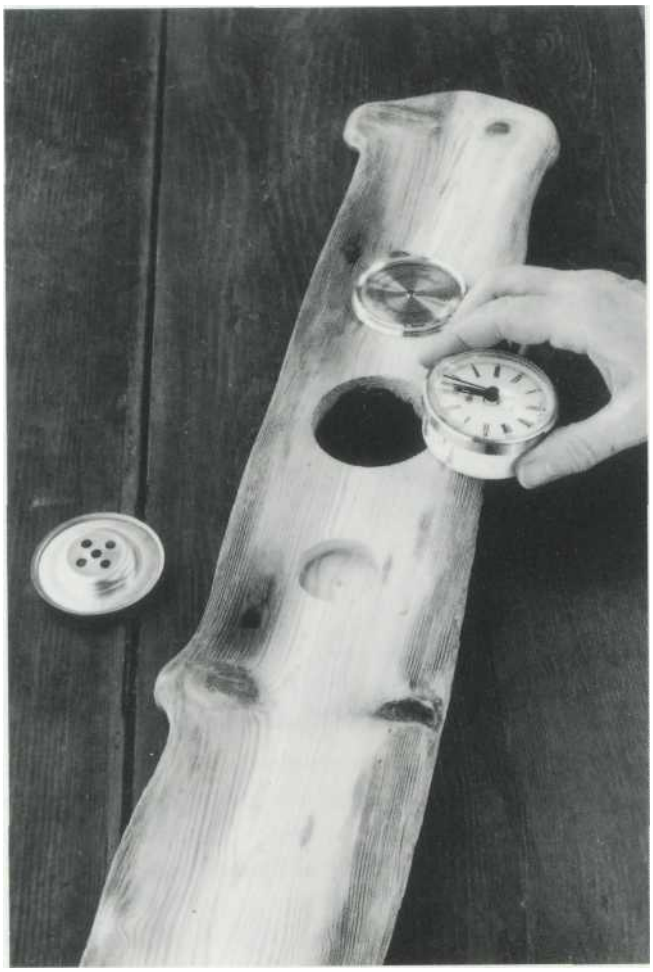


4 A close-up showing how I have concentrated use of the wire brush along the edges and around the knots, so that there is a smooth, level central area.



5 If you have a drill bit size that fits the instrument, then so much the better; otherwise, you have to drill the nearest size hole. After drilling the hole, painstakingly file it to fit. I needed to remove an all-round strip about 1/8" wide.

Note—as I said earlier in the project, I don't much like the clock as shown. On consideration, I would much prefer the little watch-clock as shown in the miniature mantle clock case project.

MAKING A TRADITIONAL BEAD-MOULDED BOARD

Having measured and marked out the board and cut it to size, use the bench plane to bring it to a smooth finish. When you are happy that the board is square and true, secure it to the bench so that one long side is hanging over the edge.

Set your moulding plane up with 3/8"-wide beading iron. If like me, you are using a single-bead cutter to plane two beads side by side—a double reed—then adjust the fence to the position for the bead that is furthest in from the edge. The procedure is: First cut the bead that is furthest in from the edge. Then reset the fence and cut the bead nearest the edge. You repeat the procedure for the other edge of the board.

Finally, having used a block plane to chamfer the ends of the board, drill out the three large-diameter holes as already described in step 5.

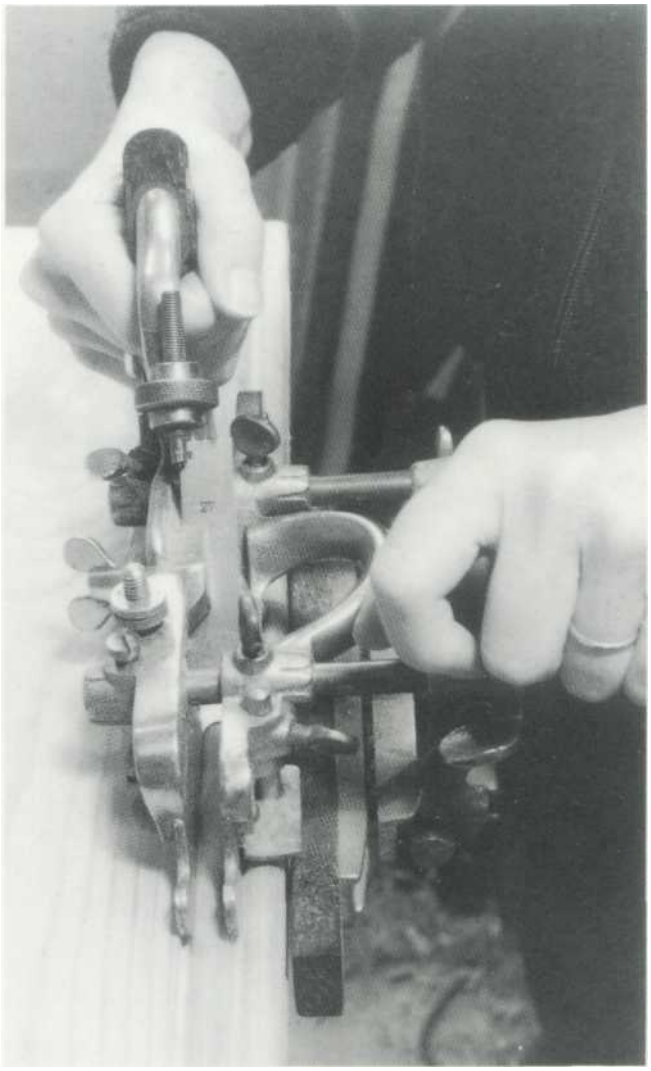
SPECIAL **TIP**

If you are looking to bore out clean-sided, flat-bottomed holes—relatively shallow holes as in this project—then you can't do better than using Forstner drill bits in conjunction with a drill press. We use a large Delta bench drill press. It doesn't wobble, or make odd noises, or require a great deal of attention. It just gets on with the job. As for the drill bits, we have a set of Forstner bits made by Freud. They do a beautiful job every single time. They bore down through end grain and hard knots, and just about anything we care to throw at them. Best of all, we like the fact that we can use them to bore out overlapping holes. Yes, they do cost about twice as much as most bits, but they last longer, stay sharp and are a pleasure to use.

MATERIALS LIST: OPTION

Board (1)	¾"×5¼"×15"—cherry

STEP-BY-STEP STAGES



1 When you have used the plane to cut the two beads side by side, reset the blade to the very finest of skimming cuts and burnish the surface of the wood to a sheen finish. Be careful not to force the pace. Just let the weight of the plane do the work.

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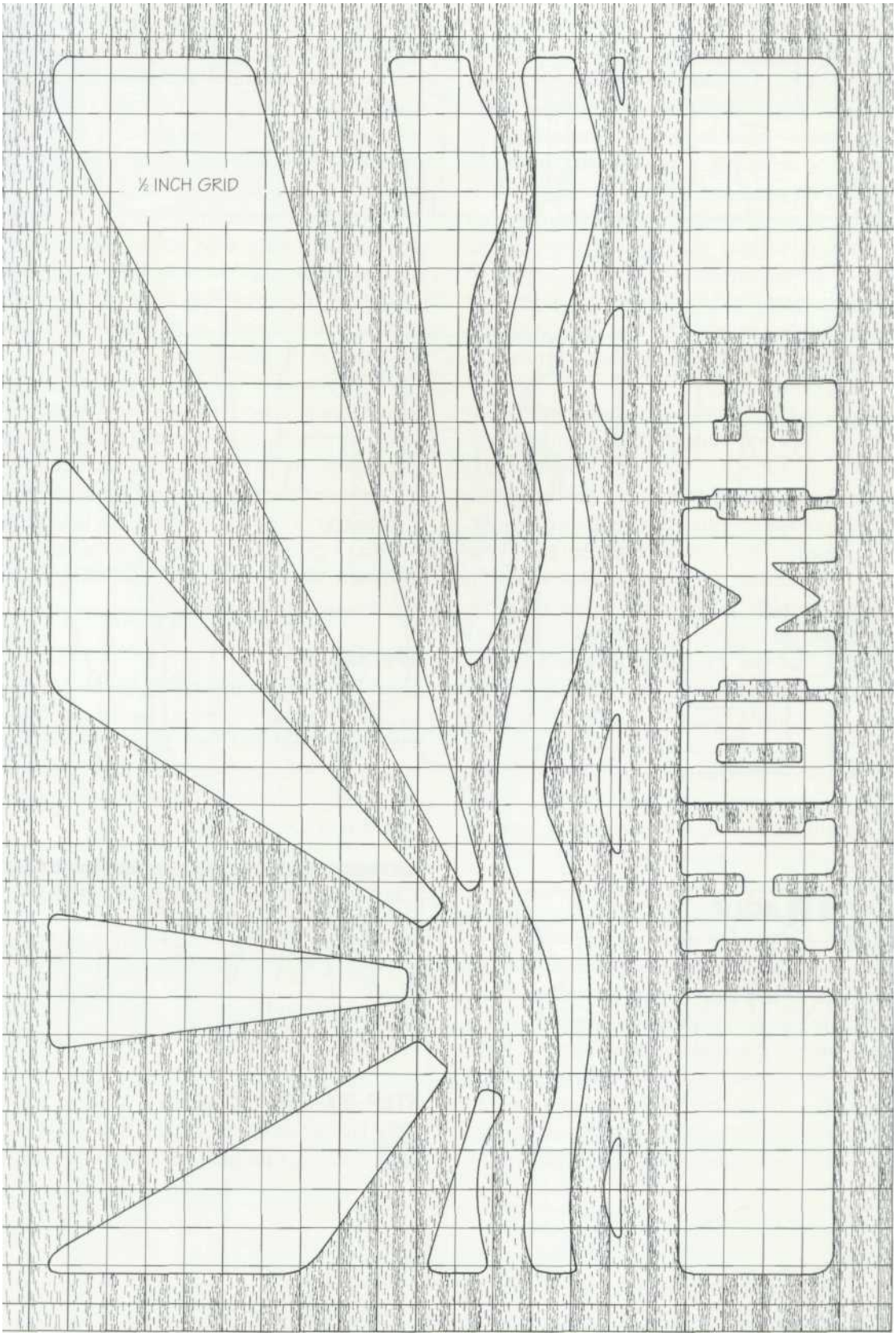
Raised Letter Address Plaque

hen we first got married, one of the joys and pleasures was having our own home. Some of the first things we did when we moved into our infinitesimally minute cottage were to paint the front door bright red and design an address plaque. The red door didn't go down too well, but the plaque was a huge success! The neighbors admired it, the mailman said it added a touch of class—in fact the whole street made comments. So, if you want to make someone a unique gift, one that will beautify their home—be it ever so humble a house, cottage, bungalow, farm, ranch or riverboat—then a fretted address plaque is a great idea.


½ INCH GRID

THOUGHTS ON DESIGN

Of all the projects in the book, the name board is perhaps both the easiest and the most complex. I say this because, while the fretting techniques are truly easy—**just** about as simple and direct as can be—the design is something again. The problem is, of course, how to achieve a good visual effect—meaning a balance between the solid wood and the pierced areas—while at the same time getting the message across and achieving a structure that is sound. For example, it's no good at all having a design that is so complex that it needs to be viewed closeup with a magnifying glass, or a house name that is more an epic saga than one or two words. Also, the shape of the pierced areas needs to be carefully thought through so that the imagery is rounded and easy to cut. You don't want lots of spiky, sharp-angled imagery that is almost impossible to cut.

We are not suggesting that you necessarily use the sunburst image and the word "Home." After all, it would be more than a little bit strange if you, your neighbors and all our readers had identical boards. What we have in mind is that you use our imagery as an inspirational guide. In fact, you can use just about any imagery that takes your fancy—birds, horses, cattle, mountains, trees or whatever. The chief design problem is being able to link the name and the imagery so that the total message gets across. Let's say, for example, that you are giving this board to your grandmother who lives by the sea in a cottage called "Harbor View." You might well have a galleon riding the waves, or seashells, or a crab, or an anchor, or gulls, or a steamer, or whatever sea-salt-and-briny imagery that suits. And your great aunt—the one who lives in the mountains—could have a plaque with peaks, or bears, or **fir** trees. So let your imagination run wild!

MAKING THE PLAQUE

First things first, you need to decide on the wood. I say this because in many ways the choice of the wood is essential to the design. While the wood must withstand the wind and the rain and be relatively easy to work, it must also be fitting for the task. For example, while oak is a good choice for our plaque which is to remain unpainted and mounted on a cottage near the sea, if you live in a pine forest or you plan to have the board painted, then you might as well use an inexpensive wood like pine.

When you have chosen your wood, and once you have achieved what you consider is a good design—with the spelling of the name double-checked—trace off the design, press transfer the imagery through to the wood, and shade in the areas of waste that need to be cut away. This done, take your drill and run pilot holes through the shaded areas. How you fret out the waste areas depends on your particular tool kit. I used an electric scroll saw, but you could just as well use a coping saw, a bow saw or even a large fretsaw.

No matter your choice of tool, the procedure is much the same. Make the pilot holes. Unhitch the saw blade and enter it through the hole. Refit the blade and adjust the tension. Then variously move and maneuver both the workpiece and the saw, so as to run the line of cut to the waste side of the drawn line.

When you have fretted out the design and used the graded sandpapers to rub the rough edges to a smooth finish, cut out the base board and bring it to a good finish. Use waterproof glue to bond the two boards together.

Finally, having first protected the wood with oil, paint or whatever seems appropriate, it's time to present the board as a gift. And if you really want to make it special, you could offer to mount the board on the wall, gate, post or other appropriate place.

SPECIAL TIP

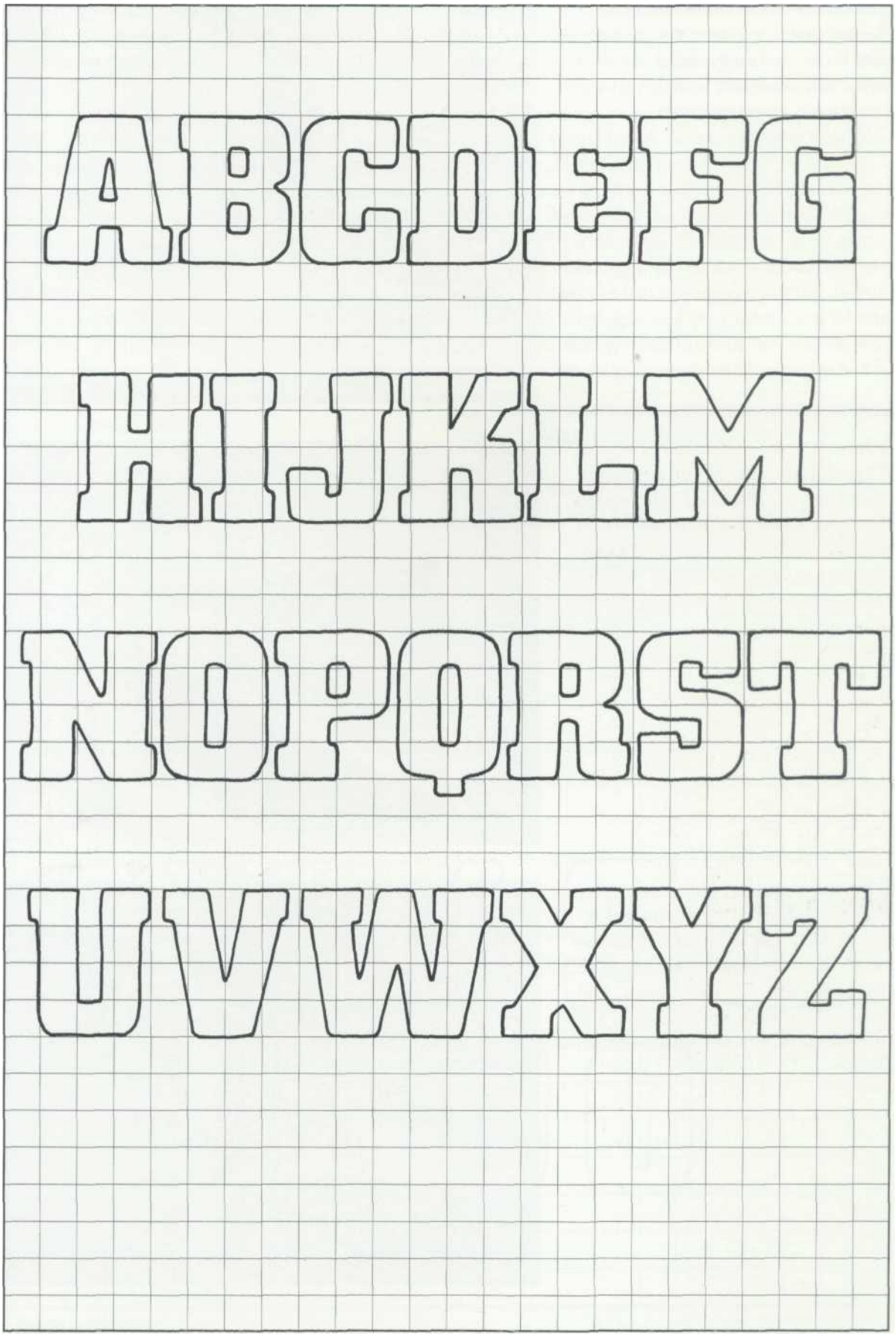
If you are going to mount the board directly on a wall, say beside the front door, it's best to use brass or bronze screws and have the board distanced from the wall by an inch or so. That way, when the ram runs down the wall and dribbles behind the board, there is space enough for a good flow of drying air.

MATERIALS LIST

A Front pierced board (1)	½″×11¾″×18″—we used oak
B Base board (1)	½″ to ¾″×11¾″×18″

STEP-BY-STEP STAGES

1 Having settled on a good, easy-to-work style of lettering, spend time drawing the letters up to size.



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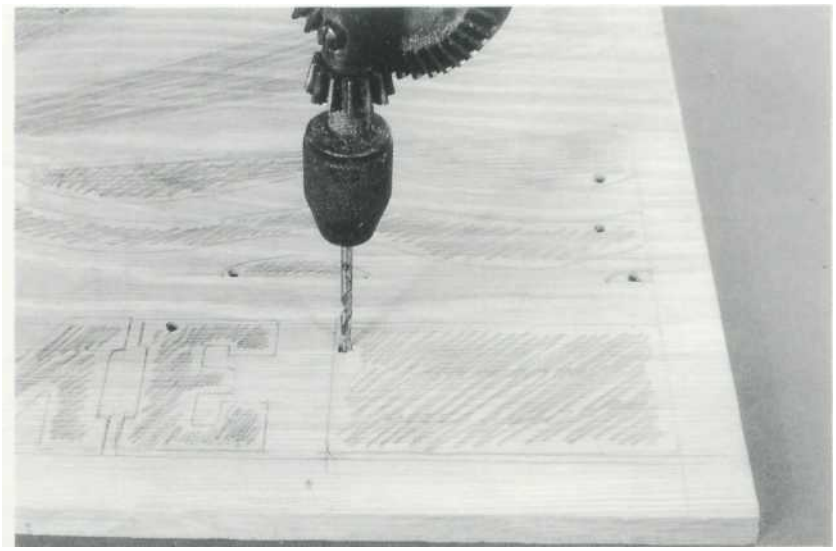
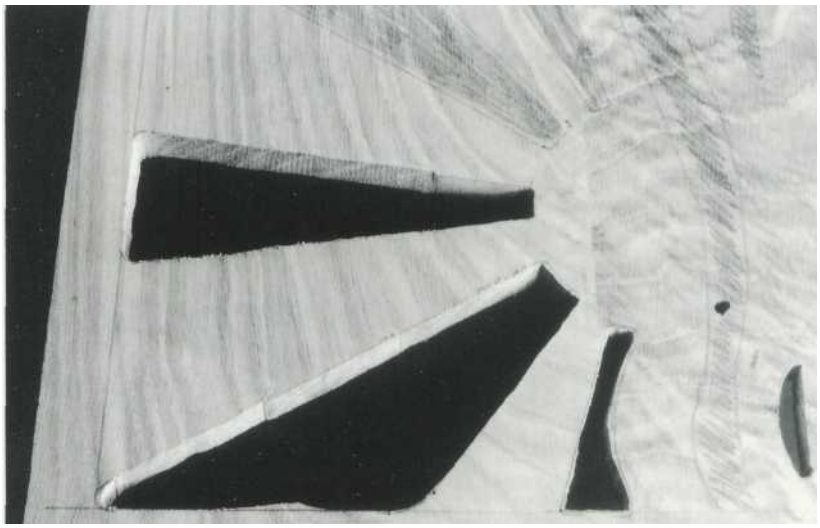
2 Run small pilot holes through the areas that need to be cut away. Be mindful if you are using a hand saw, that as some blades have pin fixings, you will have to choose a larger bit size.



3 As you can see, I had a bit of trouble keeping the line of cut on course. The problem was that the blade needed changing, the wood was amazingly tough and stringy, and I needed a rest. The only good thing you can say is that the bad cuts occur well to the waste side of the drawn line.



4 If you find that the workpiece doesn't want to move smoothly, then it's a good idea to rub a wax candle over both the surface of the cutting table and the underside of the workpiece. And don't be stingy with the blades. If the blade looks saggy or burns the wood, then change it!

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FRETTED **LETTERS IN RELIEF**

If your workshop is anything like mine, you are forever wondering what you can do with the offcuts. Well, there we were fretting out the letter shapes when one of the kids next door, Michelle Edwards, asked me if she could have the "M" and "E" waste cutouts from the word "HOME," so that she could stick them on her bedroom door. And so it was that the idea came to us that we could design a house board that used the cutouts rather than the holes, if you see what I mean.

PROCEDURE

First, you need to draw the letter and/or number forms up to size—ours are 1 1/2″ high—and trace them off. Arrange the tracing on the 1/4" wood so that the grain runs from side to side through the letters. Pencil press transfer the traced lines through to the wood.

As for the fretting out procedure, it's much the same as already described (see page 80), only easier. If you think about it, you will see that you only have to run the pilot holes through the enclosed forms—like the O and A—and you don't have to worry about saving the ground around the letters. All you do is run the line of cut in from the edge of the wood, travel around the letter and then move on to the next form.

Once you have beveled off the edges of the ground board, then comes the tricky task of setting out the various guidelines. I use the word *tricky* advisedly, because if the spacing between the letters is wrong, or the baseline on which the letters sit is crooked, or whatever, then the whole thing will be messed-up. The best procedure is to work the spacing out on tracing paper, and then use a square and straight edge to very carefully mark the base board with all the guidelines.

When you are happy with the guidelines and the spacing, smear the back of the letters with the PVA glue and dab them down on a piece of scrap wood to remove the excess. Then position them on the board and press down firmly. With all the letters/numbers in place, stand back to check the alignment and then leave them be until the glue has set. Finally, drill the four fixing holes and give the whole works a generous coat of yacht/spar varnish.

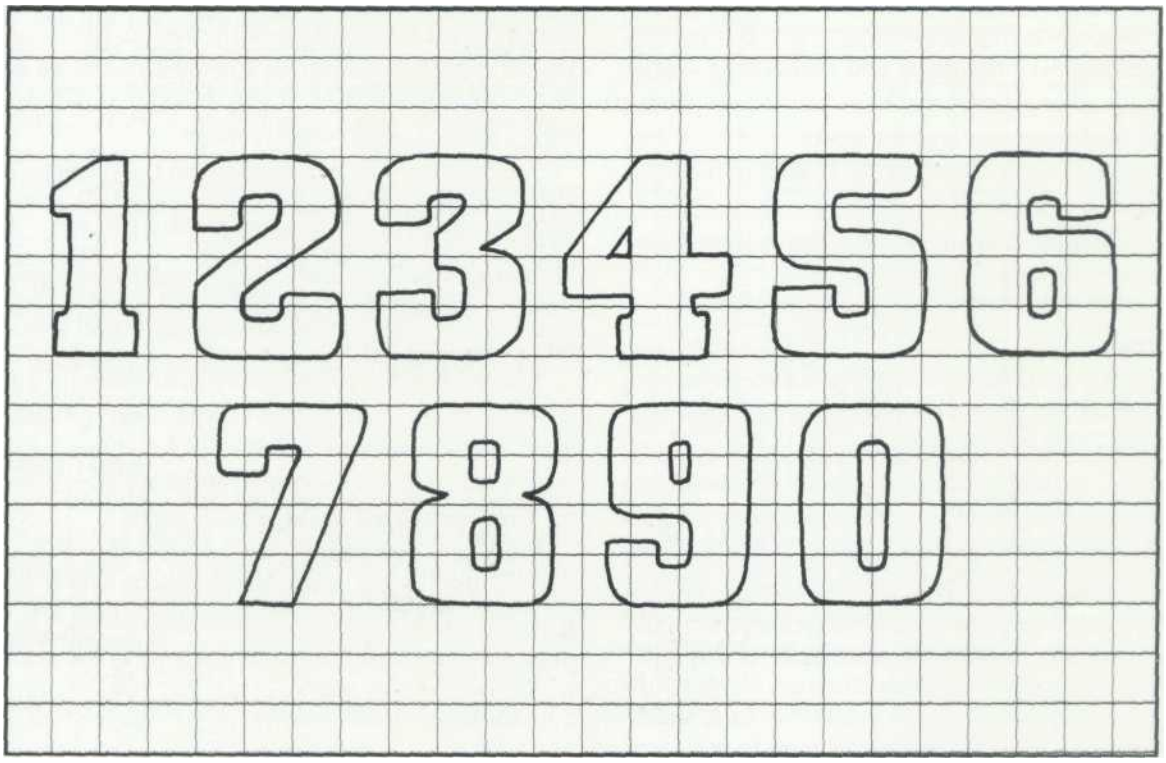
MATERIALS LIST: OPTION

A Board (1) prepared 7/8″×4″ piece of American oak at a length to suit the name of your house

B Board (1) 1/4″-thick piece of American oak—enough for all your letters

C Exterior PVA glue

D Yacht varnish



NUMBER PATTERNS

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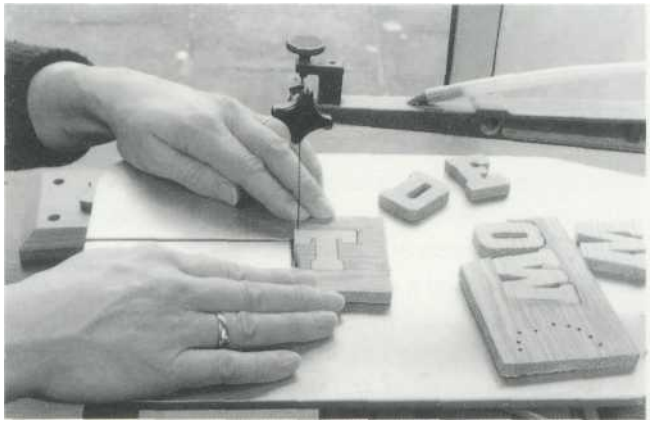
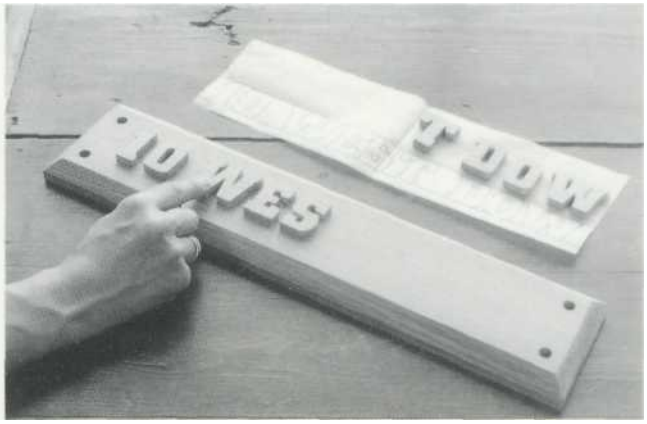
STEP-BY-STEP STAGES



1 Press transfer the various letters and numbers through to the 1/4"-thick wood. Shade in the waste so that there is no doubting the line of cut. Then fret out the letters and numbers on the scroll saw. Work at a very steady, easy pace, all the while making sure that the line of cut is fractionally to the waste side of the drawn line.



2 Check and double-check the spacing. Label the back of each letter "glue side," and then very carefully glue them in place. Do your best **to** avoid using so much glue that it oozes out.

DESIGNING AND TRANSFERRING

One of the chief difficulties for many woodworking beginners is that they make mistakes when it comes to designing and transferring. They make the first mistake when they draw the designs up to size, and the second when they transfer the designs through to the wood. The pity of it is that, by the very nature of things, the designing and transferring mistakes occur in the early stages. What invariably happens is that the beginners get so frustrated with the techniques of designing and transferring—what with using the wrong paper and with pencil lead getting smeared all over the paper and the wood—that they give up on the project before they ever get around to the wondrously exciting woodwork.

If you are having difficulties, then the following tips will help you sort out your problems.

Designing

Designing is the procedure of working out the structure, pattern and form of a project by making various drawings, taking photographs and making models or prototypes. For example, with this address plaque the lettering needed a lot of thought. The problem was that while I personally prefer what might be described as classic Greek and Roman letter forms—with serifs and thick and thin strokes—it was pretty plain to see that such a style would be totally unsuitable in terms of wood and fretsaw work. So we searched around in books until we came up with a strong, bold letter style, one that looked as if it might lend itself to being fretted out with a scroll saw. Then we modified the style slightly so that all the little angles became curves. We used a ruler and square to draw the letters to size on thin layout paper, and then, using tracing paper with ruled guidelines and a square, we played around with the spacing of the letters until the word looked right. Be warned that you must always use a square **in** all lettering projects. If you don't, you will finish up with a badly spaced, wobbly mess!

We did much the same thing with the sunburst design. Having settled on the idea of the sunburst, we drew the elements of the design on scraps of layout paper. We fiddled around with the placing and the size and then drew up a master design on white illustration board. Then we took a final tracing.

It sounds a bit complicated, but the whole idea of working in this way is that all the many roughs, ideas, alternatives, variations, scribbles and sketches are worked out on the relatively inexpensive layout paper, before they are ever transferred to the quality paper.

We take a tracing from the master drawing so that we can use the tracing in the workshop—where it generally gets creased, damaged and used to destruction. The master drawings, however, are stored safely away for next time.

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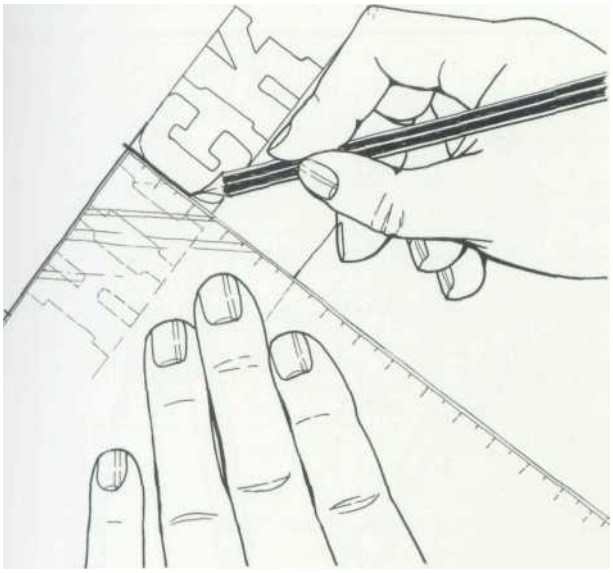


DESIGN TOOLS

A set square *is an essential piece of drawing equipment. It's best to* ***gel*** *the see-through type so you can see what's going on under the square.*

Paper, Illustration Board, Layout and Tracing Paper

We use layout paper for the initial scribbles and sketches, good-quality glazed white illustration board for drawing out the master designs, and best-grade tracing paper for the transferring. It's not that we are fussy or faddish, and it's certainly not that we can afford to splash our money around. It's just that over the years we have learned that using the choice papers generally gets the job done faster and with fewer mistakes. Certainly you might think that we could use a flimsy-grade tracing paper for transferring, but again, experience has taught us that using a cheap-grade paper is a bad bet. It tears easily, it bleeds when used with ink and it doesn't take kindly to being scratched and scraped. And the same could be said about the pencils, the illustration board and all the other designing materials—the best is cheapest in the end! All that said, you can cut costs by visiting a printer and buying offcuts and ends of rolls/packs.

Masking Tape

We use an all-purpose paper, low-tack sticky tape to secure the card and tracing paper to the drawing board, and the tracing paper to the wood. We never use transparent tape simply because it is too sticky and damages both the paper and the wood.

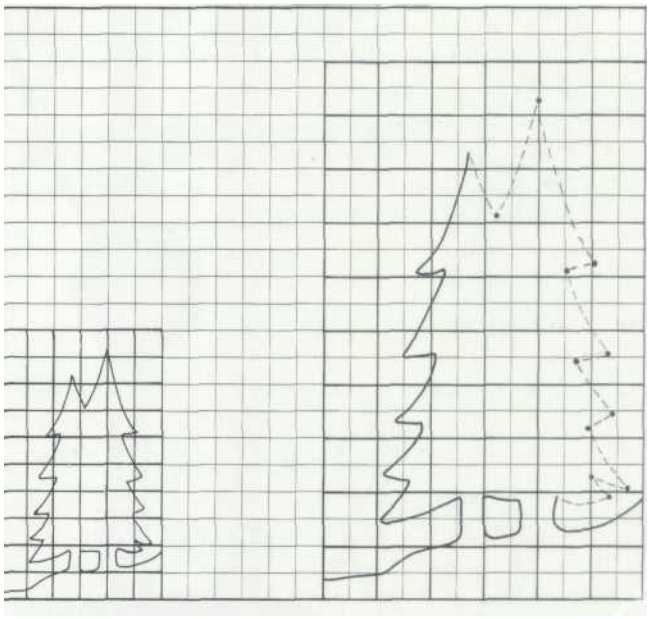
Gridded Working Drawings

A scaled square grid can be placed over a working drawing so that the object illustrated can be reduced or enlarged simply by changing the size of the grid. For example, if the grid is described as a "1" grid" or "one grid square to 1"" and the object is 6" long, and you want to finish up with an item 12" long, then all you do is double the scale and read each square off as being 2". And, of course, when you come to drawing the design up to size, you simply draw up a grid of the suggested size and transfer the contents of each square in the design through to your drawn grid.

Tracing and Pencil-Press Transferring

I usually describe the procedure of taking a tracing from the master design and then transferring the design through to the surface of the wood as "pencil-press transferring."

The procedure is: Work up the design on layout paper, make the master drawing with a hard pencil and take a tracing with a hard pencil. Next, pencil in the back of the tracing with a soft 2B pencil. Turn the tracing right side up, fix it to the wood with tabs of masking tape, and then rework the traced lines with a hard pencil or ball-point pen. This done, remove the tracing and rework the transferred lines on the wood. Finally, spray the surface of the wood with artist's fixative to prevent the pencil from smudging.

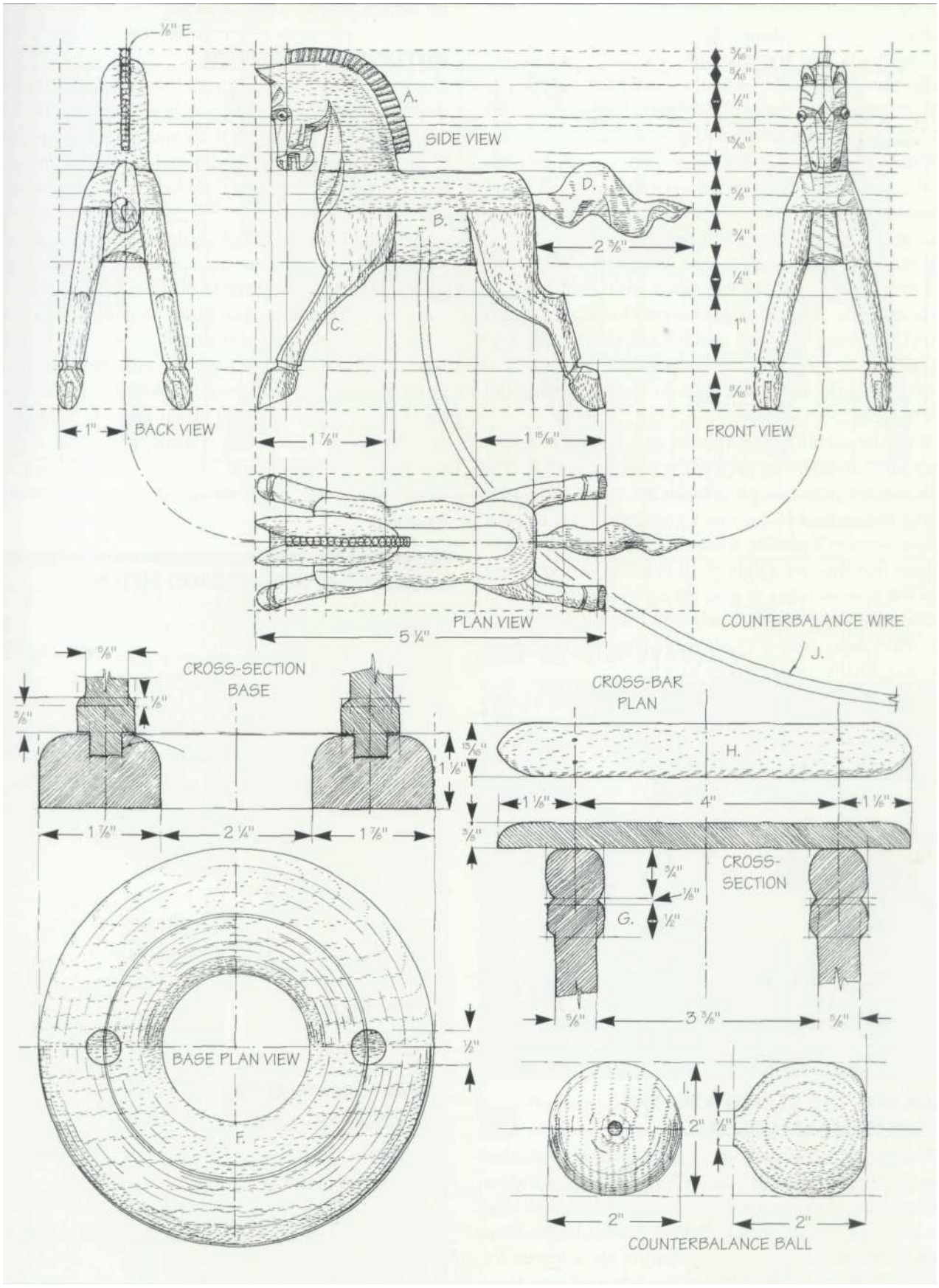


TRANSFERRING SCALED DRAWINGS

Having drawn a grid over the original design and another grid at a scale to suit—in this case 1 wanted to double up, so it is twice the size—then all you do is painstakingly transfer the contents of ***each*** *square.*

Counterbalance Horse Toy

One of the pleasures of making a traditional toy of this size, type and character is the fact that you can change the specifications, the working drawings, the imagery, and the techniques to suit your own needs and fancies. For example, you might prefer to go for an elephant or a tiger rather than the horse, or you might want a straight-sided slab rather than the turned base. Our advice is to have a good long look at the working drawings and the various photographs, and then either copy our design directly or go your own way and adjust the designs to suit.



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MAKING THE HORSE

Having roughly fretted out the shape of the head and the four legs, begin by taking the seven component parts—the head, the four legs and the two body pieces—and gluing them together to make the blank. The best procedure is to first glue the two body parts together, then fix the legs to the body and finish with the head.

Once you have made the blank, then comes the pleasurable task of whittling the horse to shape. It's all pretty straightforward. All you do is round over the back of the neck and body, swiftly model the face and the hooves, trim the legs and so on. Of course, the degree of modeling **will** to a great extent depend upon your knowledge of horse anatomy. But that said, I believe that in the context of toys, the imagery is best stylized and simplified. Or to put it another way, yes, the horse needs to look like a horse, but at the same time you do have to be mindful that it needs to be strong.

With the overall horse whittled and sanded to shape, run a saw cut down the back of the neck and glue fix the little wooden pegs that go to make the mane. After a lot of trial and error, 1 found that a good method is to cut a couple wooden barbecue sticks into 1" lengths, slice the ends so that they are a tight push fit in the saw kerf, and then use cyanoacrylate to glue the sticks one at a time in the slots. When you are pleased with the shape and placing of the pegs, dribble a tad more glue along the whole row and, finally, trim them to length.

When you come to the tail, whittle it to shape as seen in the side view, and then whittle the shape as seen in the top **view.** It is a little bit tricky because the pine is relatively hard and grainy, but you don't have to get too fussed about the precise shape. Lastly, drill two holes in the horse—one for the tail and one for the wire. Then glue the tail into place.

Making the horse is pretty easy, but if you look closely at the photographs, you will see that I needed to correct various mistakes. For example, I needed to inset strips to strengthen the hooves, and I had to glue and dowel-pin one of the legs so as to strengthen the short grain. All I am saying is don't get in a sweat if a leg splits off or something else breaks. Just make a glue-and-peg repair and start over.

MAKING THE STAND AND THE COUNTERBALANCE BALL

The stand can be as plain or as fancy as the mood takes you. As long as the height and placing of the posts allow lor the swing of the wire and the counterbalance ball, and the horizontal crossbar is level and parallel to the base, then the actual shape and construction are a matter for personal choice. I decided to go for a turned ring base, and whittled posts, crossbar and ball, but you could go for turned posts or other changes.

PUTTING IT TOGETHER

Once you have made the horse, the stand and the ball, then comes the frustrating and finger-twistmg, but very enjoyable, task of putting it all together. Start by gluing the posts in the base and gluing and pinning the crossbar. Don't forget that the posts must be parallel and the crossbar level.

Now, having first drilled a hole in the horse's belly and flattened one end of the counterbalance wire, dribble glue in the hole on the underside of the horse and push the flattened end of the wire in place. This done, drill a hole right through the ball and thread the ball on the wire. Next, bend the wire into a gentle curve and position the horse on the crossbar. Try out various curves of wire until the horse is nicely balanced. Then glue the ball in place and clip off the excess wire. Finally, give all the **surfaces** a thin coat of varnish and let it dry. Burnish the whole thing with beeswax, and the horse is finished and ready for action.

MATERIALS LIST–

HORSE	
A Head (1)	1″×2″×2¼″
B Body (2)	1½″×¾″×3½″
C Legs (4)	½″×2″×3″
D Tail (1)	⅝″×1″×3″
E Wooden barbecue sticks (2)	⅛″ diameter
STAND	
F Base (1)	1½″×6″×6″
G Posts (2)	1″×1″×14″
H Crossbar (1)	½″×⅞″×6½″
COUNTERBALANCE	
I Ball (1)	2″×2″×2″ cube
HARDWARE AND EXTRAS	
J Wire coathanger (1)	16″
K Screws and nails	various
L Cyanoacrylate	

Note that all measurements allow for a small amount of cutting waste.

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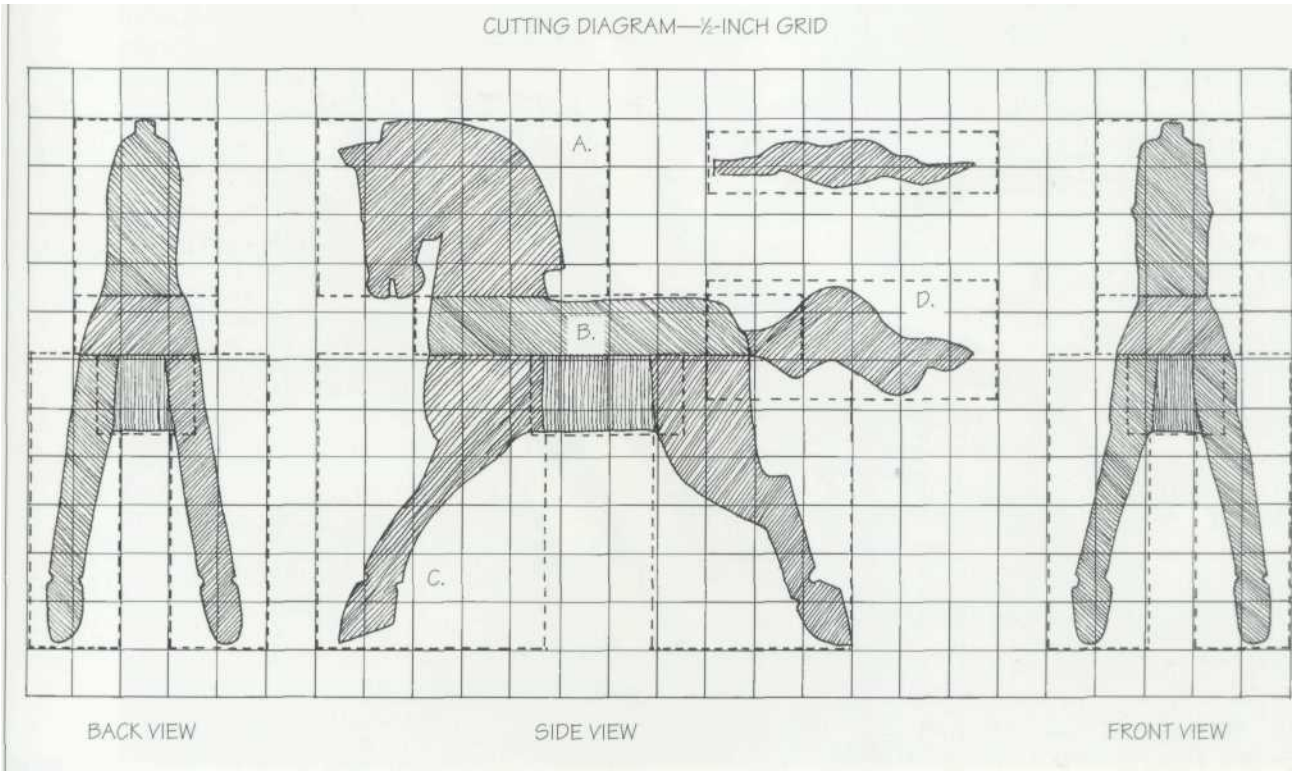
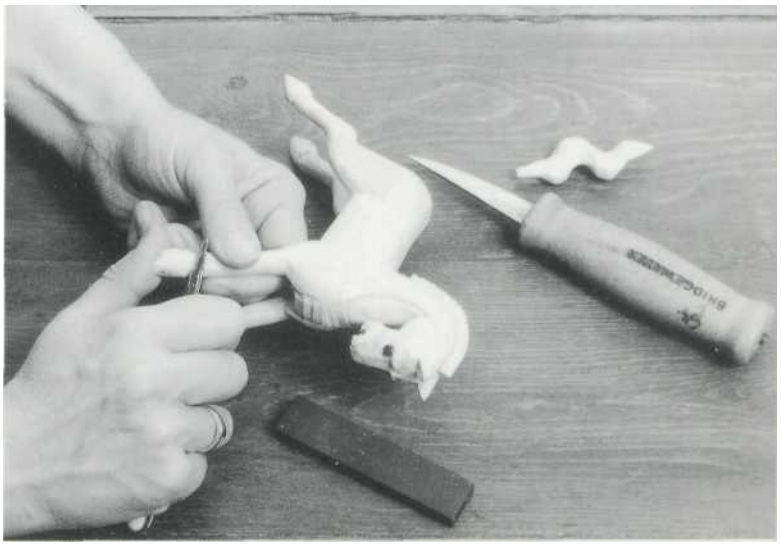


WORKING DRAWING B

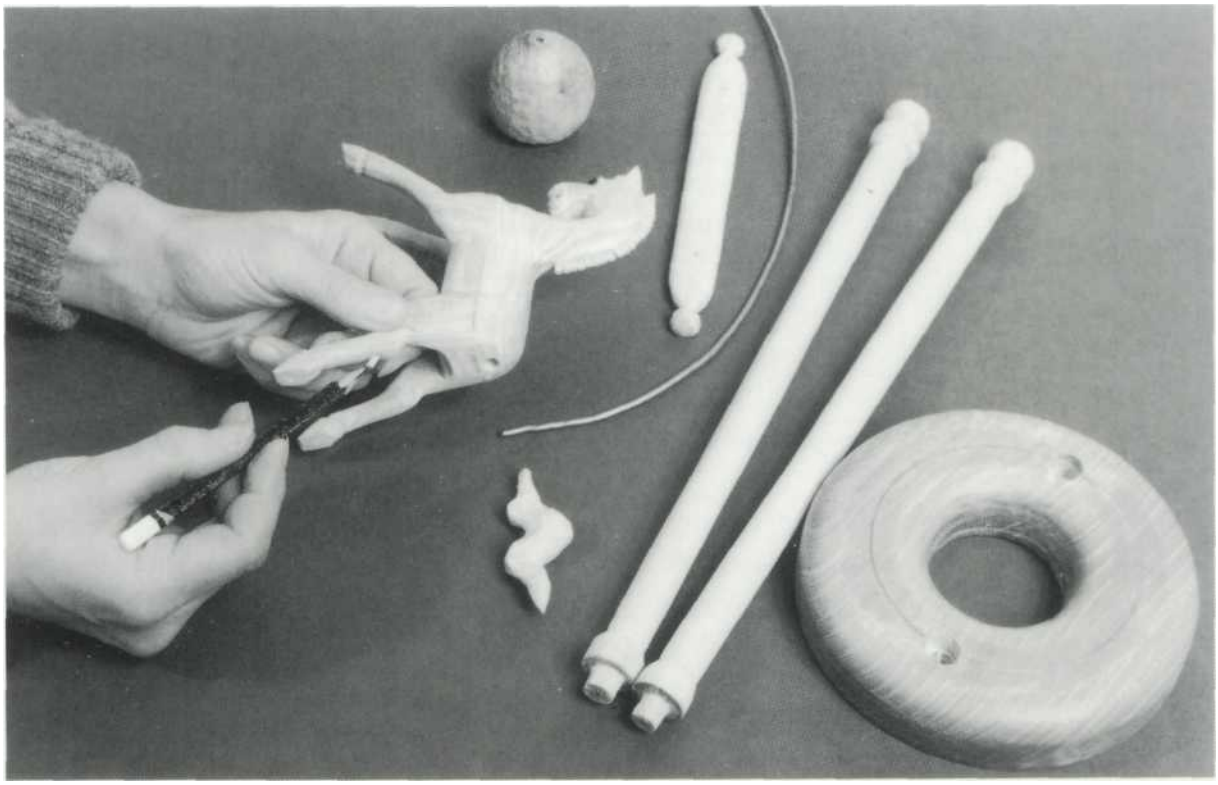
SPECIAL TIP

Gill—my wife and better half—has just pointed out that there are toys for babies, toys for toddlers and toys for adults. She says that while the balancing horse is the perfect toy for an adult—you know the sort of thing, a toy that can be played with at the dinner table when kids, friends and family are looking on—it's not the sort of toy that you give to a boisterous five-year-old!

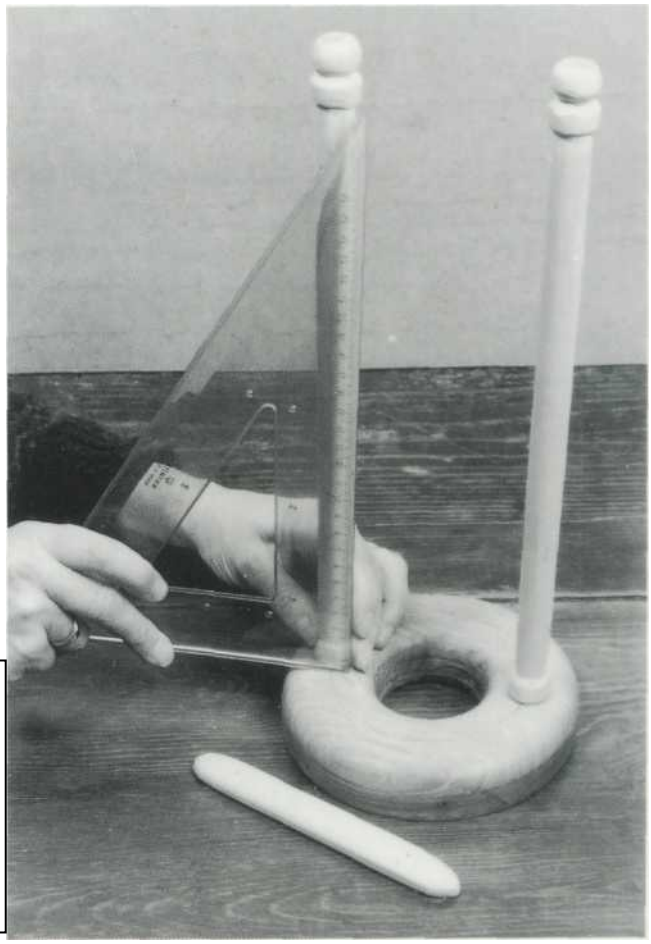
STEP-BY-STEP STAGES



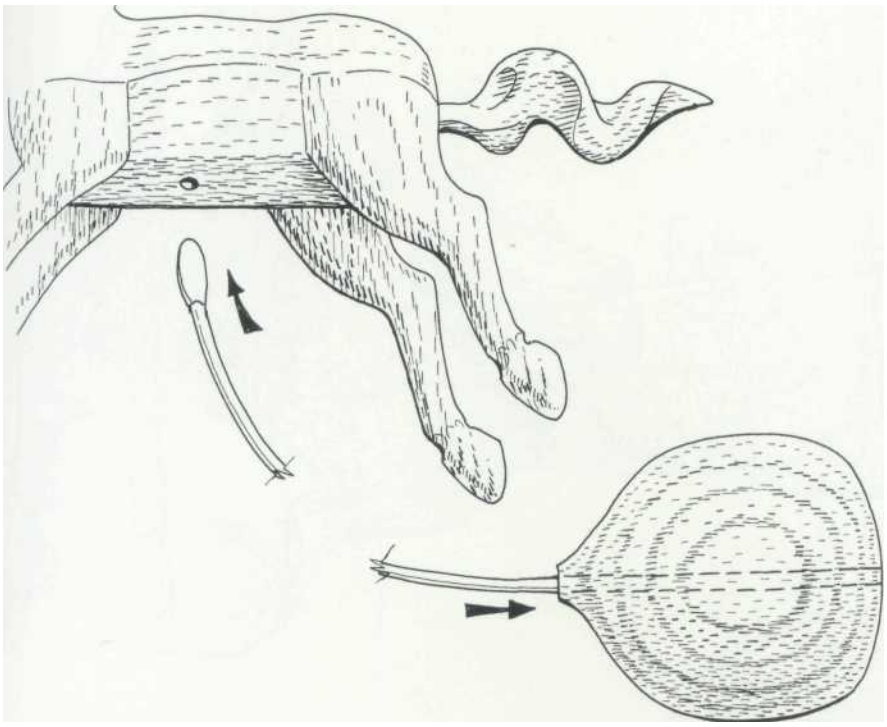
1 Having glued up the blank, use your knives to model the details. Use tightly controlled paring cuts, all the while being careful not to damage the relatively fragile short-grain areas like the ears. Note that I had a trial fitting of the eyes at this stage—I was eager to see how the overall image looked.



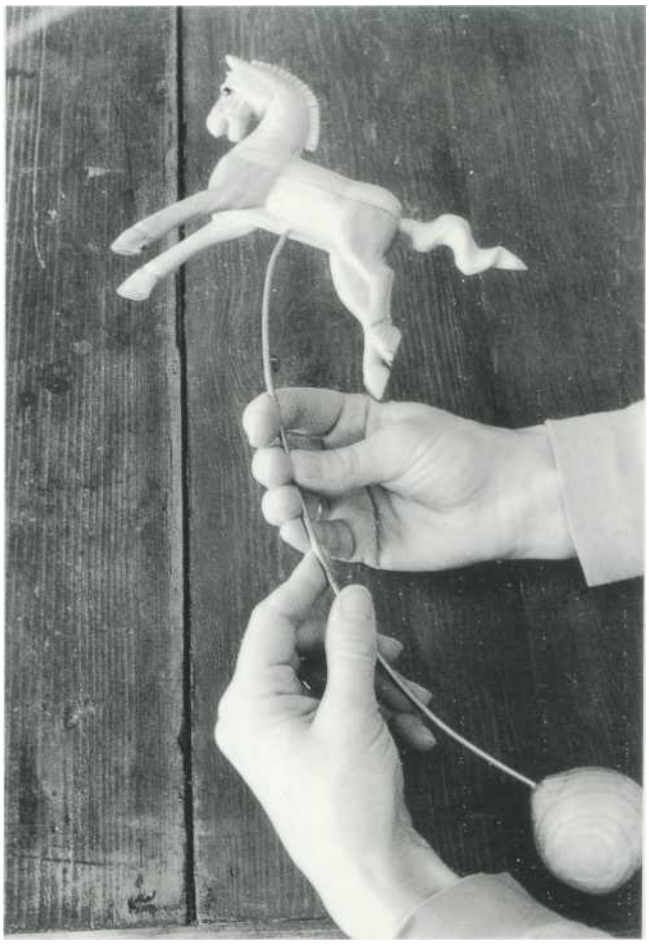
2 I had a bit of trouble when it came to the short grain on the back legs, so much so that I needed to reinforce one of them with a glued dowel. All I did was drill a hole across the run of the gram, dip a cocktail stick in glue and run it in the hole.



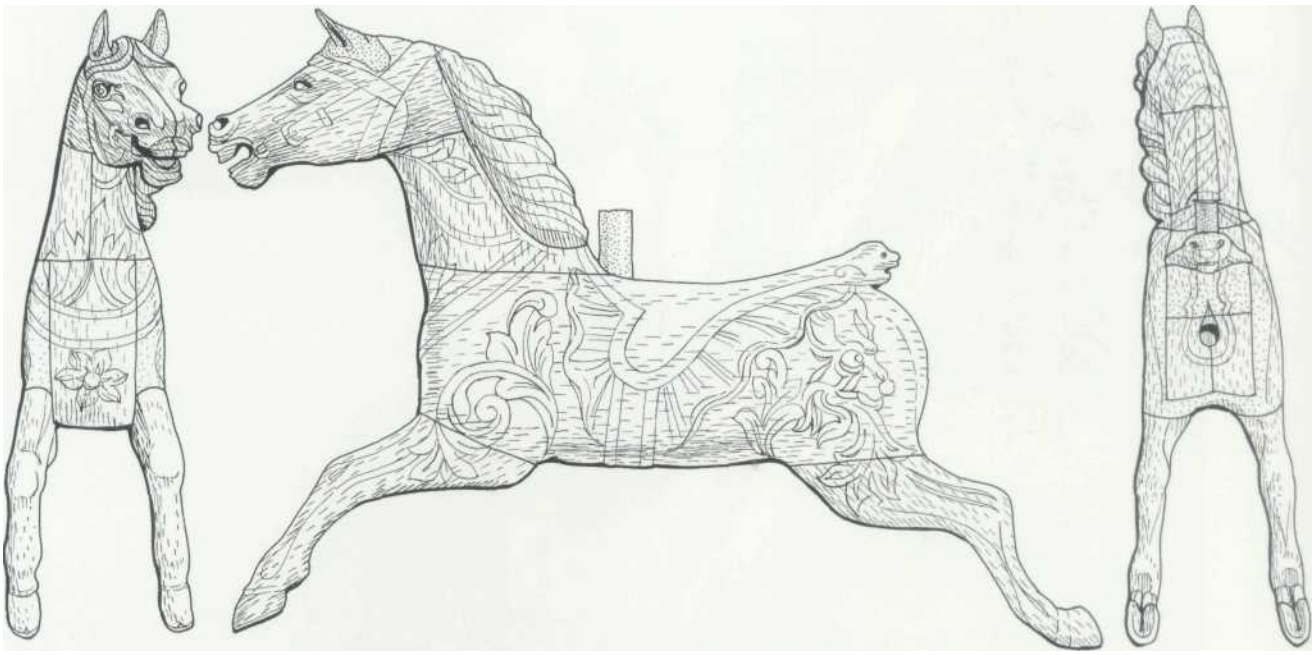
3 When you are gluing up, make sure that the posts are square to the base and parallel to each other. The good thing about using the PVA glue is that the long setting period allows you plenty of time to fiddle and fuss to get it right.



Flatten the end of the wire, smear it with glue, and then force it into the drilled hole (top). Having played around until the horse is more or less balanced, thread, glue and wedge the ball in place (bottom).



Finally, tweak the curve of the wire until the horse is perfectly posed.



DESIGN OPTION

Design for *a single-seater galloper, circa 1895-1905, by J.R. Anderson. We drew a good part of our inspiration for this project from this design.*

DESIGN OPTION

Here's *a head detail from a carousel horse circa 1926, Circus World, Orlando, Florida (lop), and a horse from the Crescent Park carousel, circa 1895, Riverside, East Providence (bottom).*

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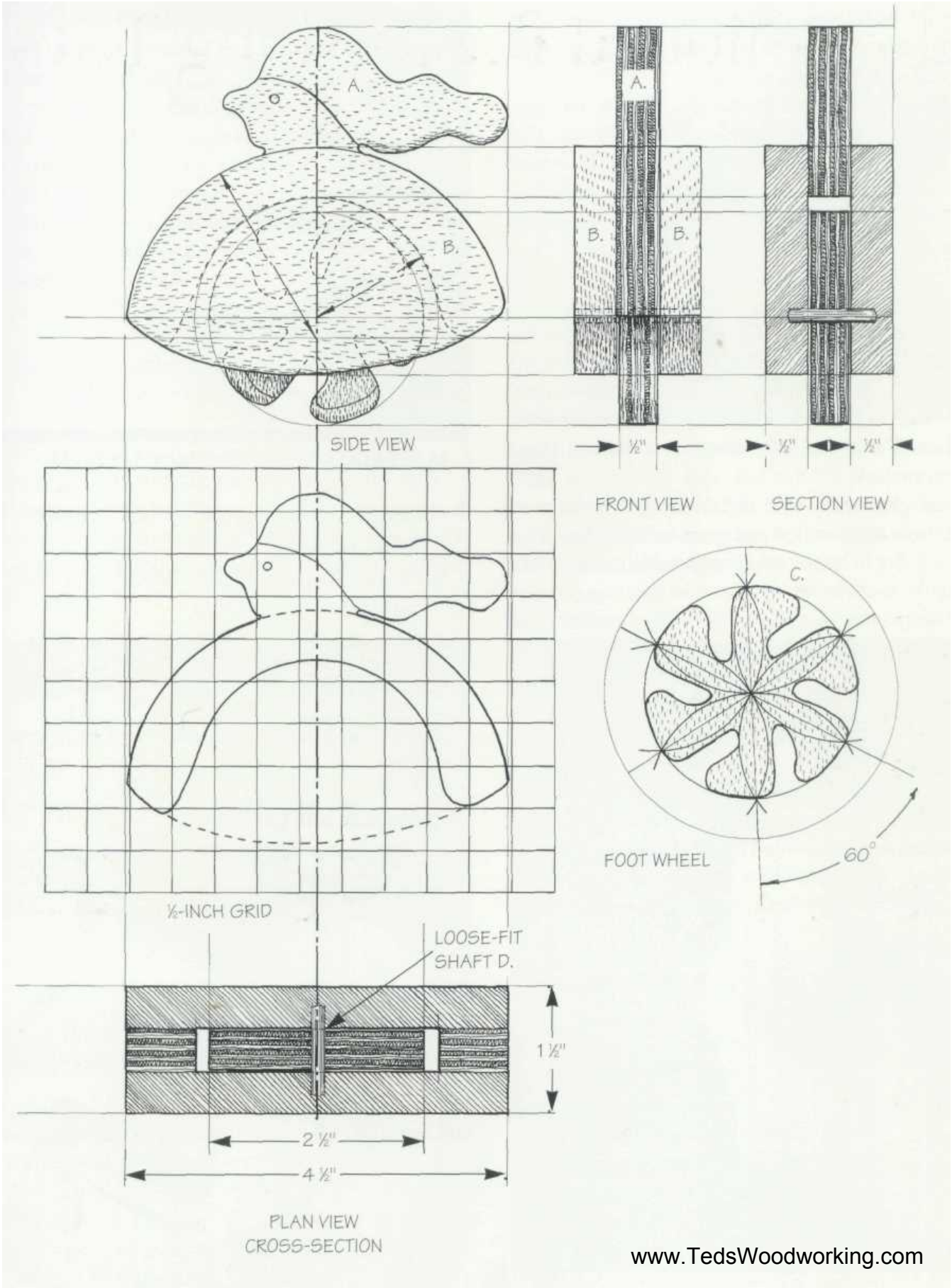
Old-Fashioned Push-Along Toys

RUNNING ROSY

A doll to kiss, a doll to cuddle—at some time or other, most of us have sought the cozy, clinging comfort of a toy doll. Running Rosy is something more than a doll. She's a sort of doll in a hurry, the perfect push-along-the-carpet plaything for younger kids. This is a beautiful plaything, a real delight for kids and adults alike. She's strong, easy to make, nicely rounded for "learning" hands, but best of all, her wheel-turning movement is just right for active toddlers who like to push toys along the floor. If you are looking to make a unique toy for a unique kid, then this is the one.

MAKING THE TOY

When you have carefully studied the working drawings, take the tracing paper, a pencil, ruler and compass, and carefully set out the design on the wood. If you are going to stay with my choice of materials—plywood sandwiched between solid wood—then you need six cutouts in all: two solid wood outside body parts, two plywood head and body spacers, and two plywood foot-wheels. If you are wondering about my choice of materials, it's pretty straightforward and logical. While the head-and-body spacer and the wheel need to be strong in all directions across the grain, they also need to be safe for kids,



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as well as relatively easy to work with a coping saw. All things considered, we thought that best-quality 1/4"-thick multi-layer plywood was a winner on many counts. It's strong, it's stable, it's easy to cut, and it's easy to bond layers together to give extra strength.

When you have made all the cutouts, rub the two foot-wheels down to a smooth, round-edged finish—so that they are smooth to the touch and the total two-wheel thickness is something less than 1/2″. Next, establish the position of the pivotal dowel holes through the wheel and into the inside face of each solid wood body part. Then drill them out with a bit size that gives you a slightly loose fit for your chosen dowel.

To assemble: Glue one body part to one side of the central head-body spacer. Set the two foot-wheels in the cavity so that the feet are facing in the correct direction. Slide the dowel in place, and, lastly, glue the other body part in place so that the foot-wheels and pivotal dowel are nicely contained.

When the glue is dry, rub the whole works down so that the corners are rounded and good to hold. Aim for a form that is going to be safe and comfortable in a toddler's hands. Finally, use watercolors to tint in the imagery, give the whole works one or more coats of clear varnish, and the toy is finished.

SPECIAL TIP

Wooden toys must be childproof! Being mindful that toddlers are, at the very least, going to stick the toy in their mouths, it's most important that all the fixtures, fittings and materials be totally secure and nontoxic. Perhaps most important of all, the wood must be splinter resistant. With all this in mind, we chose to use multi-ply for the central layer and for the wheels, for the simple reason that it's easy to work, good to touch, strong across short grain "necks," and it glues and finishes well.

Don't think you can cut costs by using the coarse-centered plywood that goes by such names as "block ply," "stout heart" and "Malaysian." I say this because plywood of this type and character tends to be difficult to work, soft, almost impossible to sand to a good finish, and prone to splintering. No, when we say "multi-ply," we are specifically referring to the type of plywood that is built up in thin 1/16" layers or veneers. A plywood of this character has a smooth, white, close-grained face, it's tremendously strong and it's great to work. Ask for "best-quality, multi-ply, multilayer or multi-core plywood," and don't be talked into anything else.

Note, a sheet of 1/4"-thick multilayer plywood should be made up of four or five thin veneer layers.

MATERIALS LIST

A Head-body spacer (2)	¼″×5″×5″ plywood
B Outside body parts (2)	½″×3″×5″ solid wood
C Foot-wheels (2)	¼″×3″×3″ plywood
D Pivotal dowel (1)	¼″ dowel × 1¼″ long

Note that all measurements allow for a small amount of cutting waste.

HARDWARE AND EXTRAS

E Artist's watercolor paints—colors to suit
F Clear varnish

USING PLYWOOD

Best quality multi-ply is a first choice material for small cutout type toys. It is *amazingly strong and it rubs down to a good smooth-to- touch finish.*

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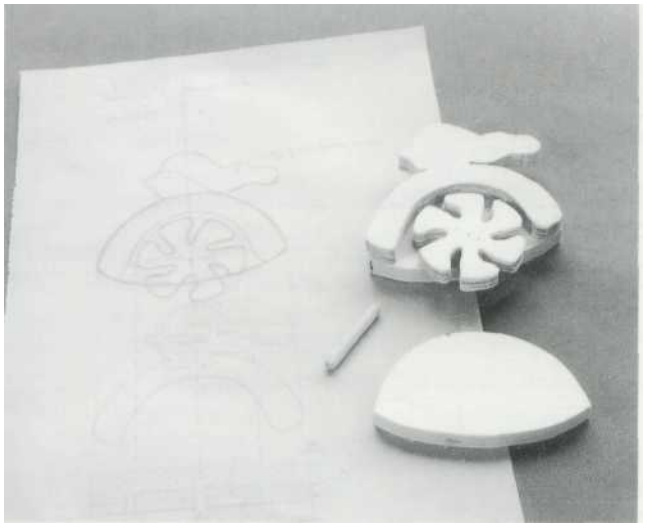
STEP-BY-STEP STAGES

1 Check the component parts against the working draw ings. And just in case you are wondering why I opted to use two 1/4"" thicknesses to make up the 1/2"-thick spacer—rather than a single 1/2" thickness—the simple answer is that I had lots of pieces of 1/4" ply that needed to be used up.

2 Fix the two wheels together with a piece of double-sided sticky tape and rub them down so that they are slightly less than 1/2" in total thickness. The use of the tape not only ensures that both wheels are identical, it also makes them easier to handle.



3 Test the wheels in the body cavity. They need to be an easy loose-turning fit. Note that in this test run I have the feet running in the wrong direction!

4 Rub the whole works down to a smooth finish. Close your eyes to test the finish—it's vital that every surface, edge and angle be supersmooth to the touch.

RUNNING REG IN HARDWOOD

Kids are so perceptive! When our Rosy toy was finished and up and running, I took it around to the 5-year-old girl next door for a bit of no-nonsense, in-depth criticism. Of course 1 was expecting a little bit of praise, but, oh no. All she said was, "But. . . where is running Reg?" So there you go, we had no other option but to make a Running Reg toy.

COUNTERCHANGE CUTTING

The clever thing about this project is not so much the design, but rather the way the two contrasting thicknesses of wood are cut and then counterchanged. It's an amazingly simple but subtle technique. All you do is sandwich two contrasting sheets of wood together, fret the design through both layers, and then swap the cutouts around so that the cutouts are contrasting.

PROCEDURE

Take the four pieces of wood—the sycamore, the mahogany, and the two pieces of plywood—and use the double-sided sticky tape to make a sandwich that has the plywood as the filling. When you are happy with the arrangement, carefully press transfer the traced imagery through to the sycamore side of the sandwich. Use the scroll saw to fret out the outside profile. This done, ease off the outside layers—the sycamore and the mahogany—and stick them together.

Cut out the **plywood** inner shape and the wheels. Then comes the very clever procedure of counterchange cutting. The method is beautifully simple. All you do is take the two profiles— the sycamore and the mahogany, all nicely stuck together with the double-sided tape—and saw them down into all the little parts that go to make up the design. For example, with this design I ran cuts through at either side of the hat band and under the chin. All you then do is swap the cutouts around and put the toy together in much the same way as already described.

MATERIALS LIST: OPTION

A (1) Prepared sycamore or maple wood—½″×5″×6″

B (1) Prepared thick dark wood—I used a piece of salvaged mahogany—½″×5″×6″

C (2) Pieces of plywood—¼″×5″×5″

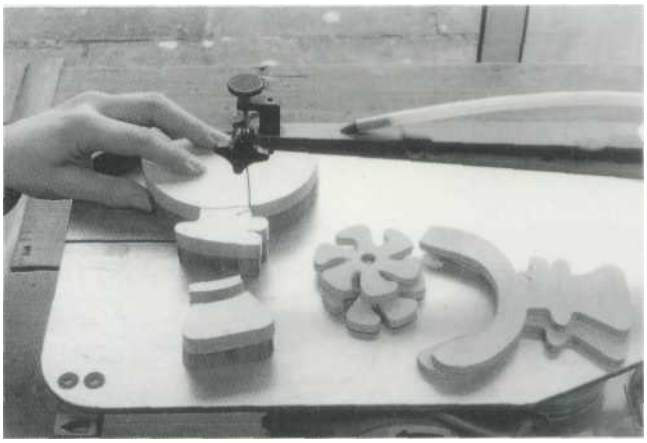
HARDWARE AND EXTRAS

D PVA glue

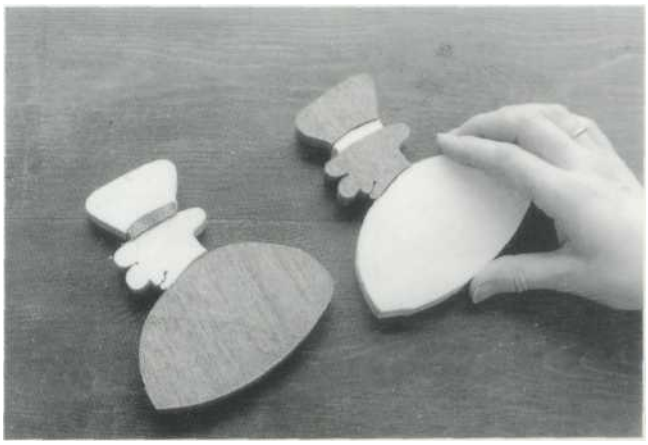
E Yacht varnish

F Double-sided sticky tape

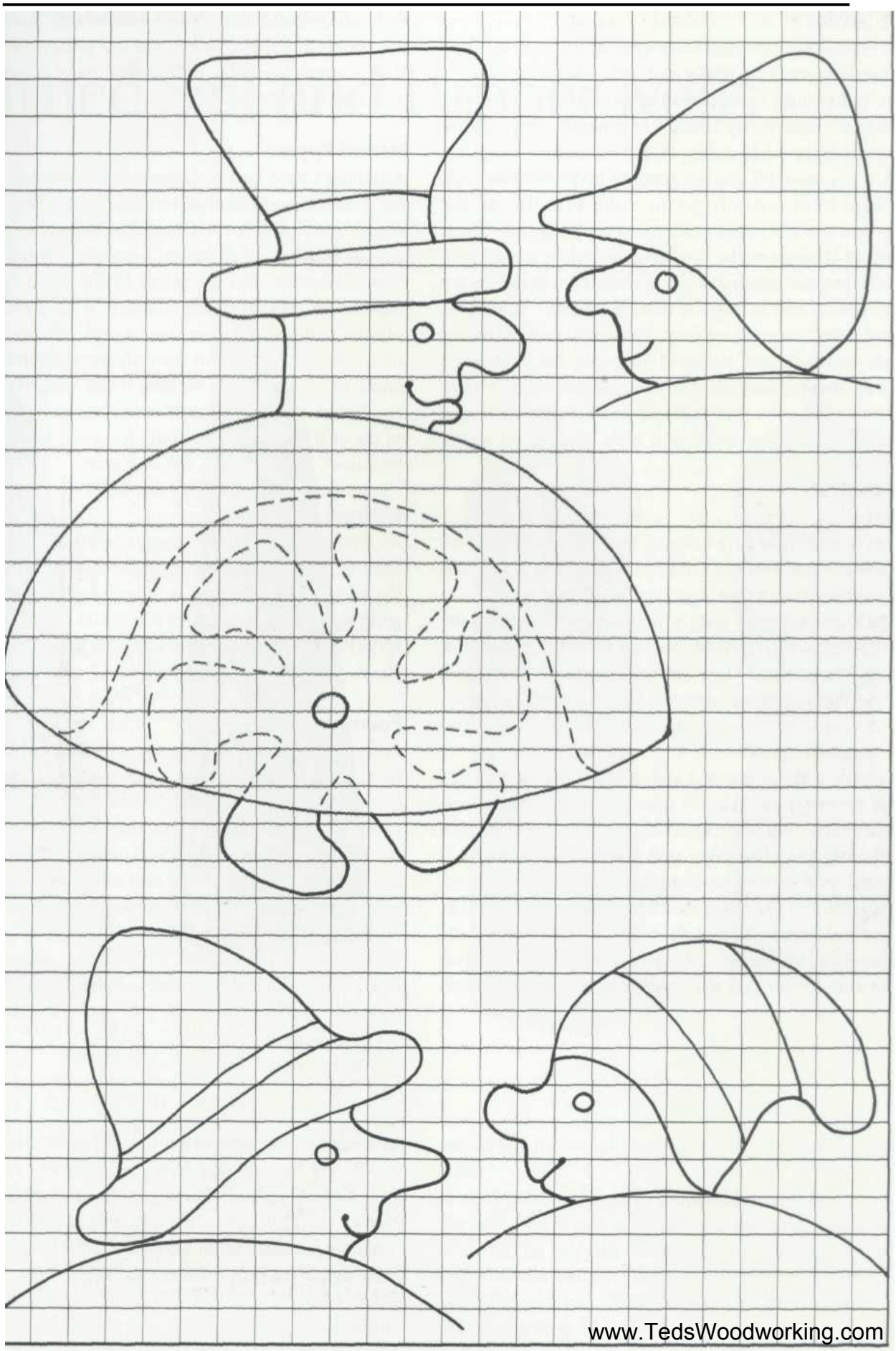
STEP-BY-STEP STAGES



1 Having fitted the very finest blade in the scroll saw, very carefully cut the design down into its component parts. It's important that you use a new, well-tensioned blade and go at it slowly, so that each and every cut is well placed and square to the wood.



2 Ease the layers apart, remove the double-sided tape and counter-change the parts. Note the little cut that goes to make the design of the mouth.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TOY SAFETY

Traditional wooden toys are enormous fun! Woodworkers like making them and kids like playing with them. But you do have to bear in mind that the average, intelligent finger-sticky toddler is generally going to do his level best to push the toy in his mouth and/or up his nose, if not worse! If you are going to make wooden toys, you have most certainly got to make sure that all the structures and all the materials are completely safe. If you are going to present the toys as gifts and/or make them for sale, you are legally bound to make sure that they are "safe, sound and fitting for their purpose." What this means is that you must ensure that every part of the toy is safe—no splinters, no toxic materials, no loose parts that can be swallowed. Be warned, ignorance is no excuse under the law—*you must make sure that everything is safe!* The following will provide you with some good sound guidelines.

Paint

Since kids like brightly colored toys, it's vital that you make sure that you use paints that are completely safe and nontoxic. Yes, your dad's old paint might still be in good condition, and, yes, it would give a wonderfully glossy, hard-wearing finish, but then again, it is almost certainly poisonous! Most old paints contain all manner of toxic mixes, everything from lead and antimony to arsenic. You must set out on the assumption that all old paints are dangerous.

When 1 asked around, I was assured that all modern paints are required by law to meet certain nontoxic, lead-free standards. But when I took it a bit further and phoned a paint manufacturer, they said that though their paints do most certainly come within safe standards, they don't necessarily come up to the standards required by the "Toy Safety" laws. As you can see, the whole area of paints and toy safety is somewhat difficult. I personally think that the best advice is either to use water stains and cover them with water-based varnish or to use acrylic paints. If you are concerned about paints and toy safety, then it's best if you write to various well-known paint manufacturers and ask their advice.

Wood Types

Although I have had no personal experience in this matter, I do understand that certain exotic wood types are dangerous if they are chewed. For example, I read of a case in which a child chewed a wooden toy from a Third World country, and the juices in the wood caused the child to go into some sort of shock. II we err on the side of safety and take it that some wood varieties are toxic, then the best advice is to use only wood varieties that we know to be safe. So, if we take it that modern American and British toymakers know what they are doing, it looks to me as if we should be going for wood types like lime, sycamore, beech, birch, oak and pine.

Fittings

As I remember, kids are always trying to pry their toys apart **in** an effort to find out how they work. This being the case, it's a good idea to avoid nails, small pieces of wire, and component parts that could in any way crack, splinter or shatter. The best advice is to use brass screws, glued dowels and glued layers.

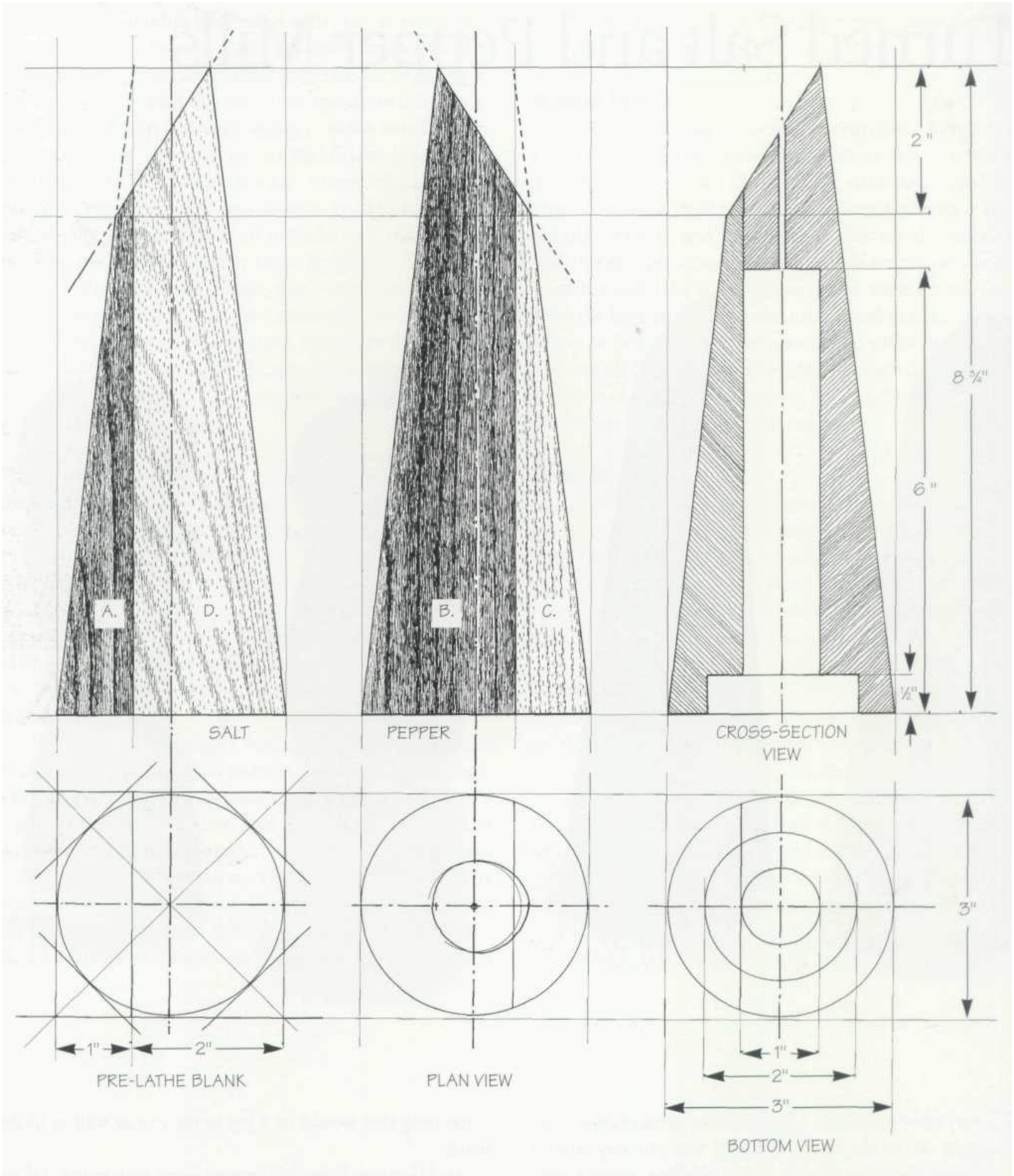
Form

In many ways, the form a toy takes is as important as its substance and structure. For example, if a toy has a component part that is long, thin and spiky, or a part that could be swallowed, or a part that could be inserted into the ear or nose, then it follows that the toy in question has been badly designed. If and when you are designing your toys, or if you decide to modify this one, you must make sure that it's safe. For example, it might be a good idea to extend the walking girl's hair so as to make more of a handle, but the question is—would it be safe?

Turned Salt and Pepper Mills

Every once in awhile, a good project idea comes to me right out of the blue. And so it was one day when I was sitting down to dinner. I was fiddling around with our horrible diminutive, pressed plastic, difficult-to-hold salt and pepper mills, and trying to fill them for the umpteenth time, when the idea suddenly came to me—Eureka! I could make a couple of cone-shaped mills on the lathe—something really big, bold and sculptural, something that wouldn't need filling every ten minutes or so, something that would be a joy to the eye as well as to the hand.

And that was how this project came into being. Okay, perhaps they aren't to everyone's taste and, yes, they are a bit on the big side—but they are certainly a unique conversation piece. The over-coffee chat usually goes something like, "Where did you get those er . . . big/strange/terrible/unusual/beautiful salt and pepper mills?"—ha!



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MAKING THE SALT AND PEPPER MILLS

When you have studied the project and generally brought your lathe and tools to order, take your chosen wood and cut it to size. You need four 10" lengths in all: one dark and one light 1 1/4" X 3", and one dark and one light 2 1/4" X 3".

Plane the mating faces and glue and clamp them together so that you have two 3" X 3"-square sections. If you have done it right, the two blocks will be color counterchanged, so that one is predominantly dark with a light strip and the other visa versa. You can, of course, glue the wood up from larger section material—so that you have a single large lump—and then slice it down to size.

First establish the end centers of the blocks. Scribe out 3"-diameter circles and clear the bulk of the waste so that you more or less have octagonal sections. Then mount the wood on the lathe and swiftly turn it down to a 3"-diameter smooth, round section. With the workpiece held securely in the four-jaw chuck and pivoted on the tailstock center, take the dividers and mark off the total 8 3/4" length. Take the parting tool and sink a tool-width channel at each end. Run the tool in to a depth of 1" so that you are left with a 1 "-diameter core at each end of the turning. Now, with the narrow end of the cone nearest the chuck, take the gouge and make repeated passes from right through to left.

When you have made the cone shape, carefully part the waste off at the tailstock end. With the drill chuck mounted in the tailstock, run two holes into the wide end of the cone—first a 2"-diameter hole at about 1/2" deep, followed up by a l"-diameter hole at about 5″ to 6" deep.

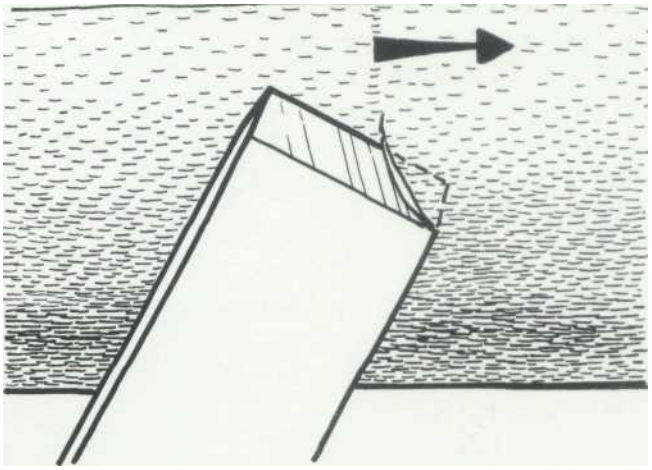
Finally, part the cone off from the lathe, run a ¥52"-diameter hole down into the top of the cone at top center, and saw off the top of the cone so that it is truncated at an angle. Rub down to a smooth finish and then burnish with a small amount of vegetable oil.

MATERIALS LIST

A Dark wood (1)	1¼″×3″×10″—we used American Walnut
B Dark wood (1)	2¼″×3″×10″
C Light wood (1)	1¼″×3″×10″—we used English Hornbeam
D Light wood (1)	2¼″×3″×10″

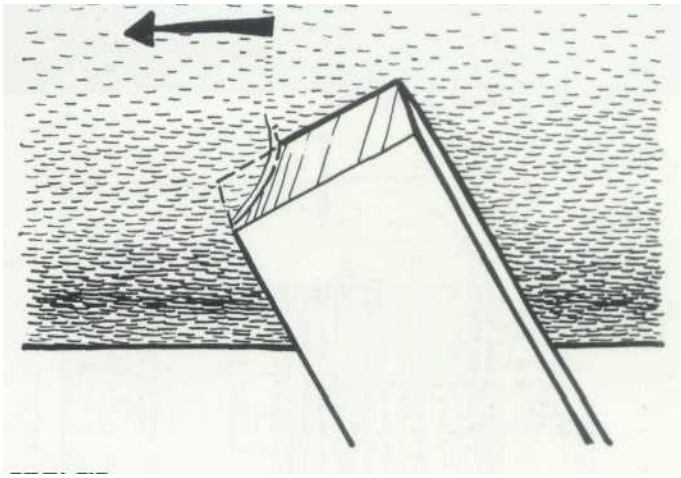
HARDWARE AND EXTRAS

E Corks or plastic stoppers to fit the 1″-diameter holes



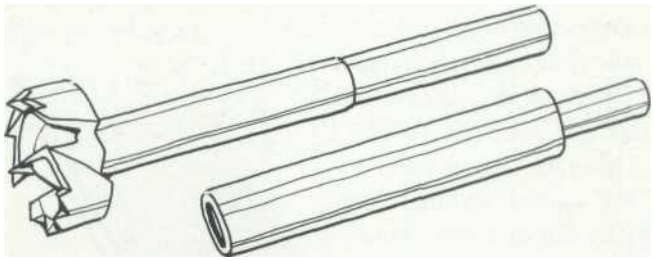
TOOL TIP

When you are using a turning chisel, the procedure is to lift the handle up until the lower end of the cutting edge begins to bite, then advance the cut in the direction of the blade. If you work in this way, you will find that the skewed approach greatly minimizes tool pressure and consequent flexing of the workpiece.



SPECIAL TIP

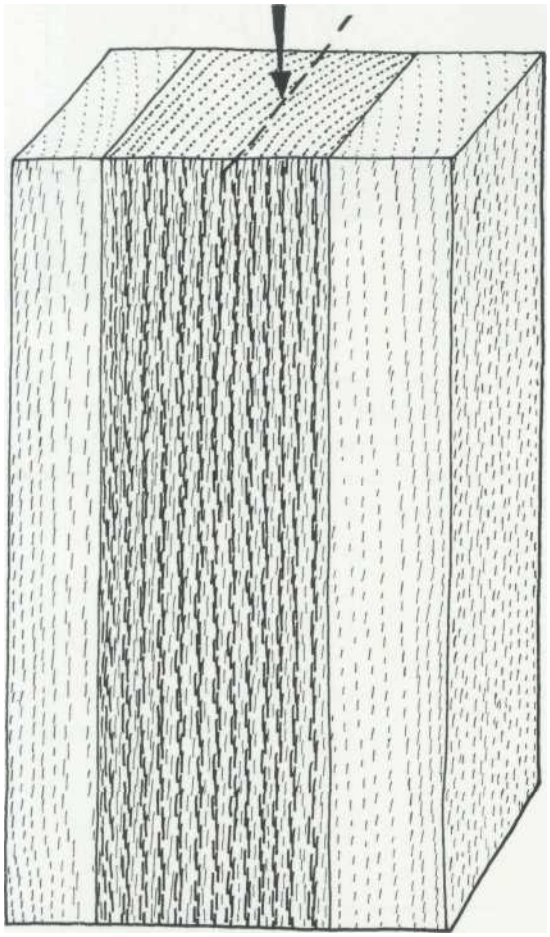
Because the gist of this project has to do with being able to drill deep, accurate, smooth-sided holes, I would always advise using either a Forstner bit or a saw tooth multi-spur-type bit. As to the actual drilling procedure, if you have to do it off the lathe—say on a drill press—then be warned, if you go off center, there is a big chance that you might break through the walls of the cone.



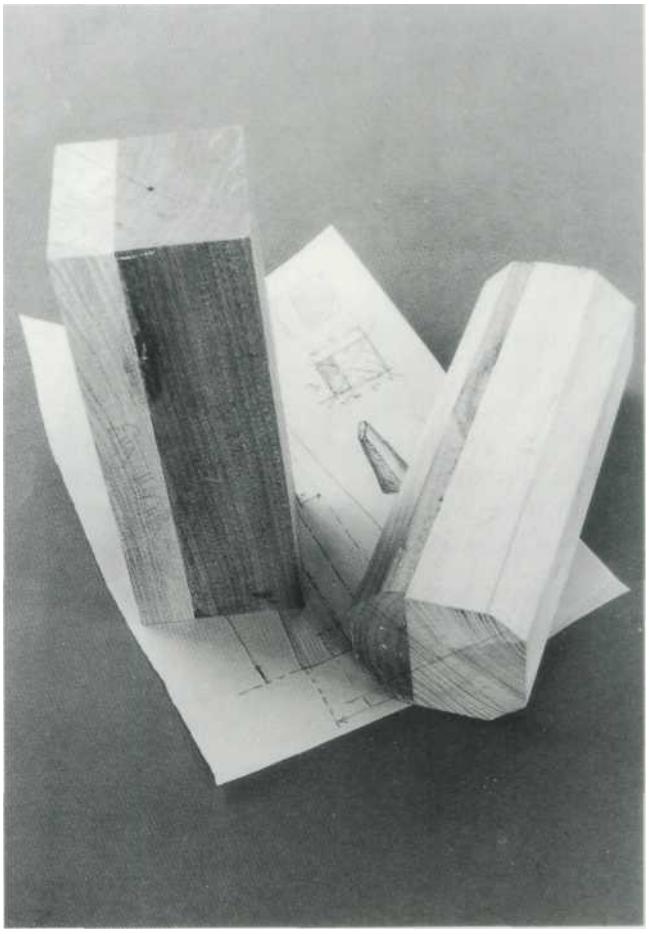
DRILLING HOLES ON THE LATHE

If you need to drill holes on the lathe, then it's best to get a Forstner or multispur bit with an extension bar.

STEP-BY-STEP STAGES



1 If you don't like the notion of gluing up small individual strips of wood or you are working with bigger pieces, a very economical method is to glue up the three blocks as shown, and then saw the resultant piece through from end to end.



2 If you are working on a small lathe, it's always a good idea to clear the bulk of the waste by planing the wood to an octagonal section. You need to finish up with two blanks, one predominantly light and the other predominantly dark.

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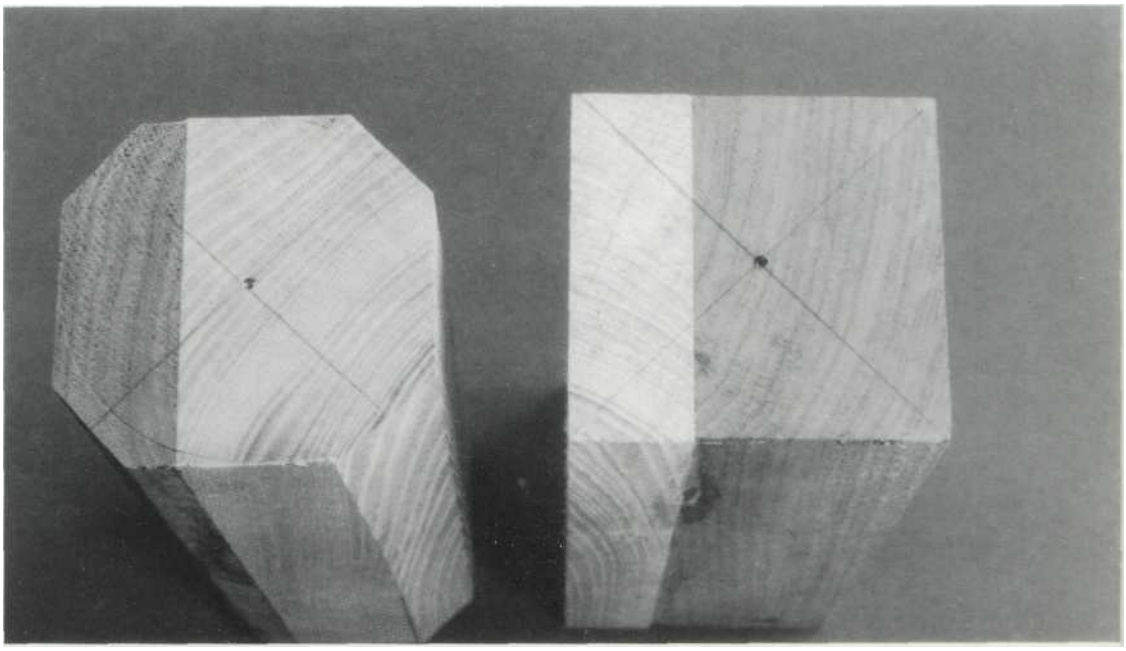
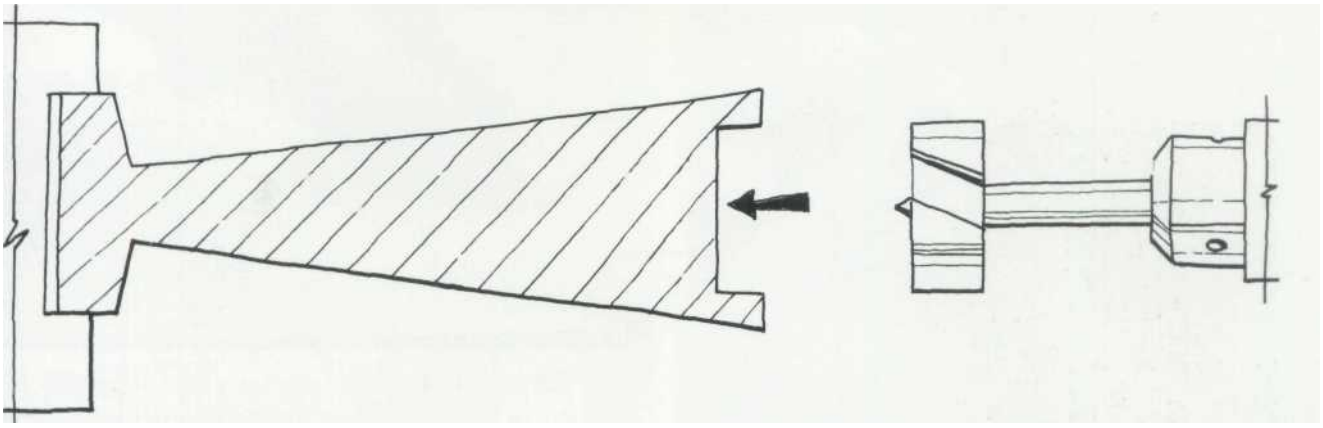
3 In the interest of safety, you must make absolutely sure that the laminations are sound and well glued. If you have any doubts at all, it's best to start over. Be warned, if ever you should decide to modify this project and go for different light-dark proportions—meaning a different gluing-up arrangement—you must make sure that the lamination line occurs well clear of the center of spin. If you don't, there is a danger that the tailstock point will force the wood apart.





THE FACE PLATE

Using a faceplate is a good, sound means of securing a large blank. ***Notice*** *the use of short, fat screws for maximum holding efficiency.*

4 With the workpiece held secure in the jaws of the chuck, lit a 2"-diameter Forstner bit in the tailstock chuck and run a 1/2"-deep hole into the end of the cone.

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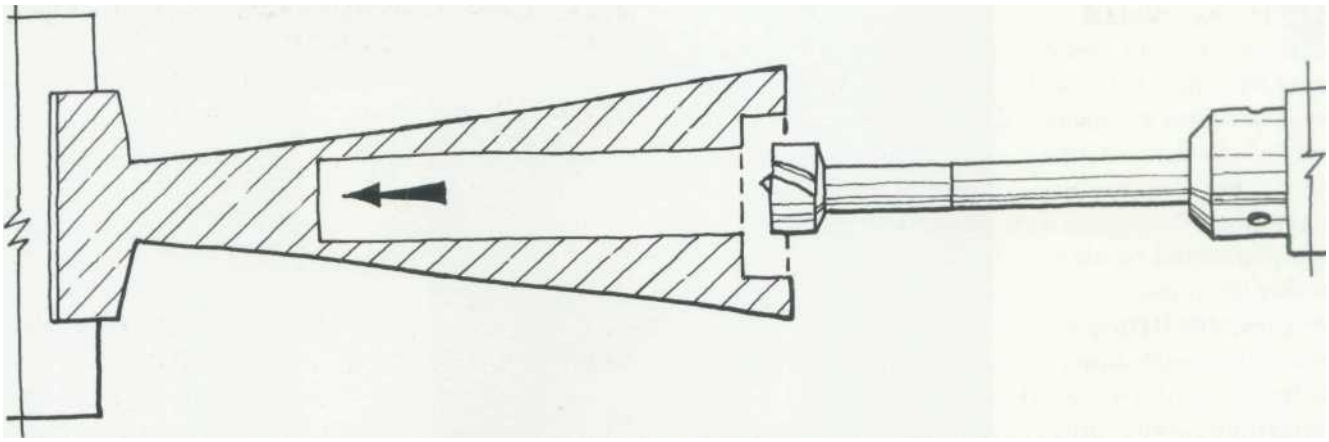
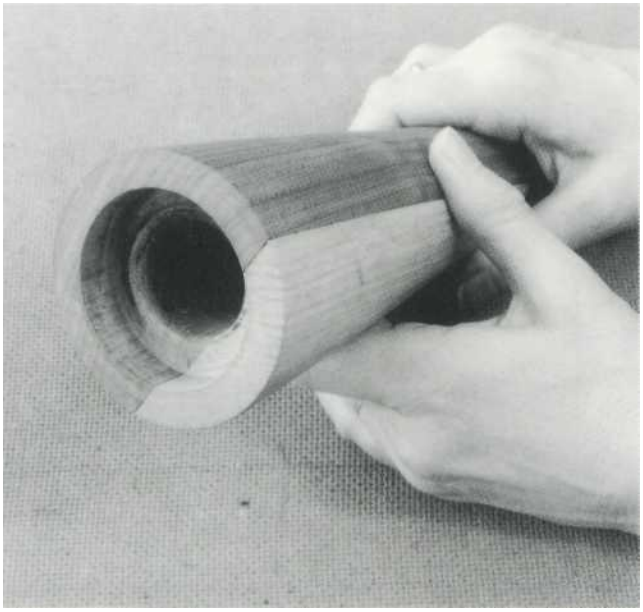
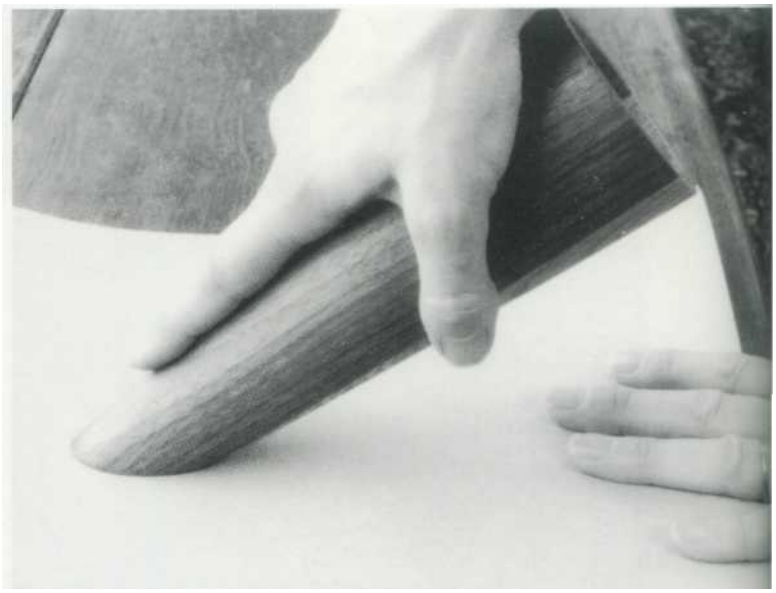


5 Having made the 2"-diameter hole, follow up with a 1" bit and sink a hole to a depth of about 5", 1/2″ at a time. The procedure is, run the bit in 1/2" and then back out, and then back in another V2", and so on, so that you remove the waste little by little and give the bit a chance to cool off.



6 The drilled and recessed base allows you to fit all manner of corks and plugs. If you like the idea of the project but want to go for something a little more sophisticated, then many specialist suppliers stock small brass screw-stopper-and-collar units that can easily be fitted into the recess.



7 Having drilled the 3/32"-diameter hole down into the top of the cone—right through to the cavity—and used a fine-tooth backsaw to truncate the cone, use the graded sandpapers to achieve a smooth finish.

GRINDING MILLS

Traditional Colonial-style salt and pepper mills are fascinating! It's not so much the way they fit together and operate—although this is very interesting in itself—but the way they are made. There is something really exciting about the procedure. One moment you have a couple of lumps of wood and the next you have two little machines. Really good fun!

MATERIALS LIST: OPTION

A (2) 2½″×2½″×12″ pieces of beech

B (2) 7½″-long mechanisms—one for salt and the other for pepper

THE PROCEDURE

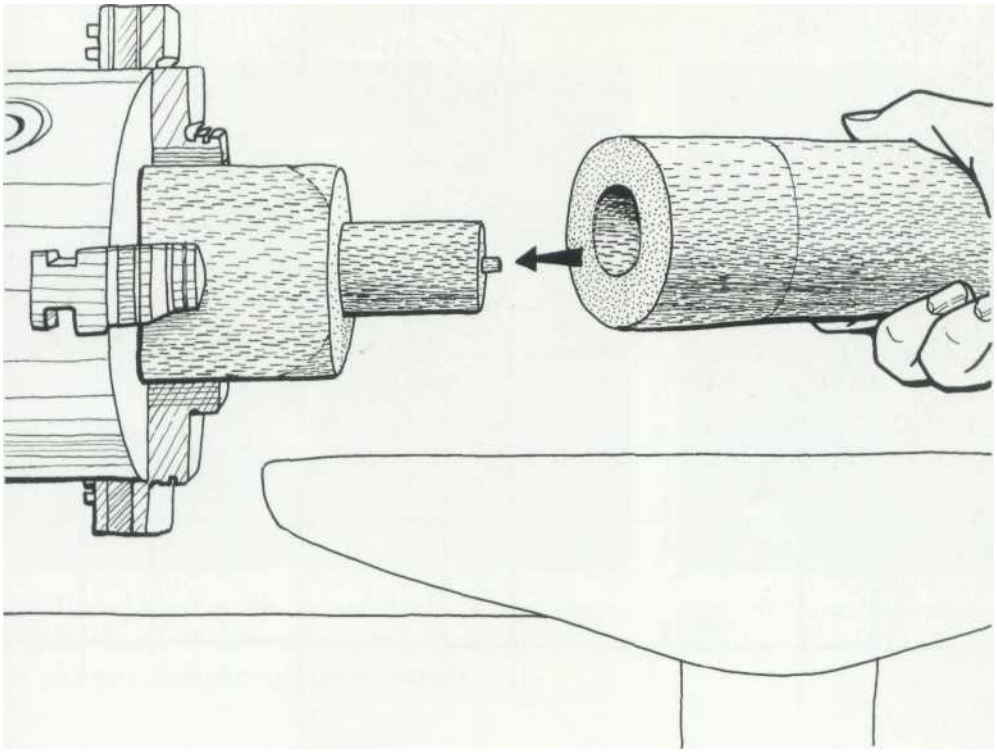
Having first made sure that the wood is free from splits and cavities, mount it on the lathe and swiftly turn the greater part of the length down to a 2 1/4"-diameter cylinder. Run guidelines around the cylinder so that the top part of the mill is nearest to the tailstock end of the lathe.

Turn the top of the mill—called a capstan—to shape and very carefully part off. Fit the tailstock drill chuck, set the l 1/8"-diameter Forstner bit in the chuck, and run a hole into the end of the cylinder. Sink the hole in to a depth of about 3". Part off the 5 1/5"-long cylinder.

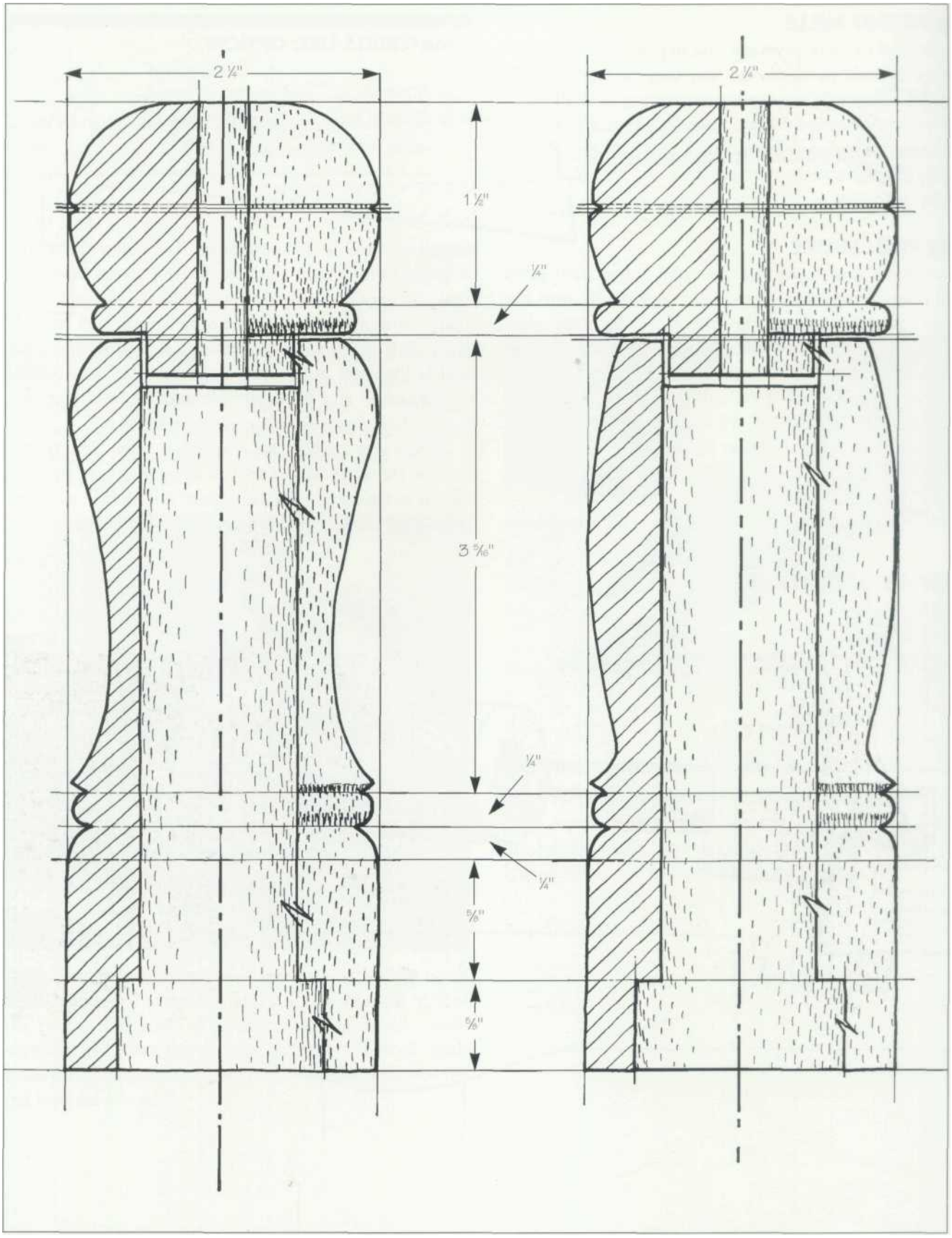
Wind the tailstock up so that the remaining short length of wood is well supported. Turn off a spigot that is going to be a tight push fit in the l 1/8"-diameter hole that you have drilled into what will be the top end of the body. Now, slide the body onto the spigot, refit the tailstock drill chuck and bore different size holes into what will be the base of the mill body. Bore the first hole at 1 1/2"-diameter and 1/2″ deep, followed up by the second hole at 1 1/8"-diameter and as deep as it will go.

When you are this far, the rest is easy. You simply reverse the body of the mill in the chuck—so that the base is in the chuck—fit the capstan on the mill, and then wind up the tailstock and turn the mill to shape.

STEP-BY-STEP STAGES



1 Having turned the capstan to shape and parted off, drill a 1 1/8"-diameter hole into what will be the top of the body. Then push the cylinder onto the spigot.



WORKING DRAWING B

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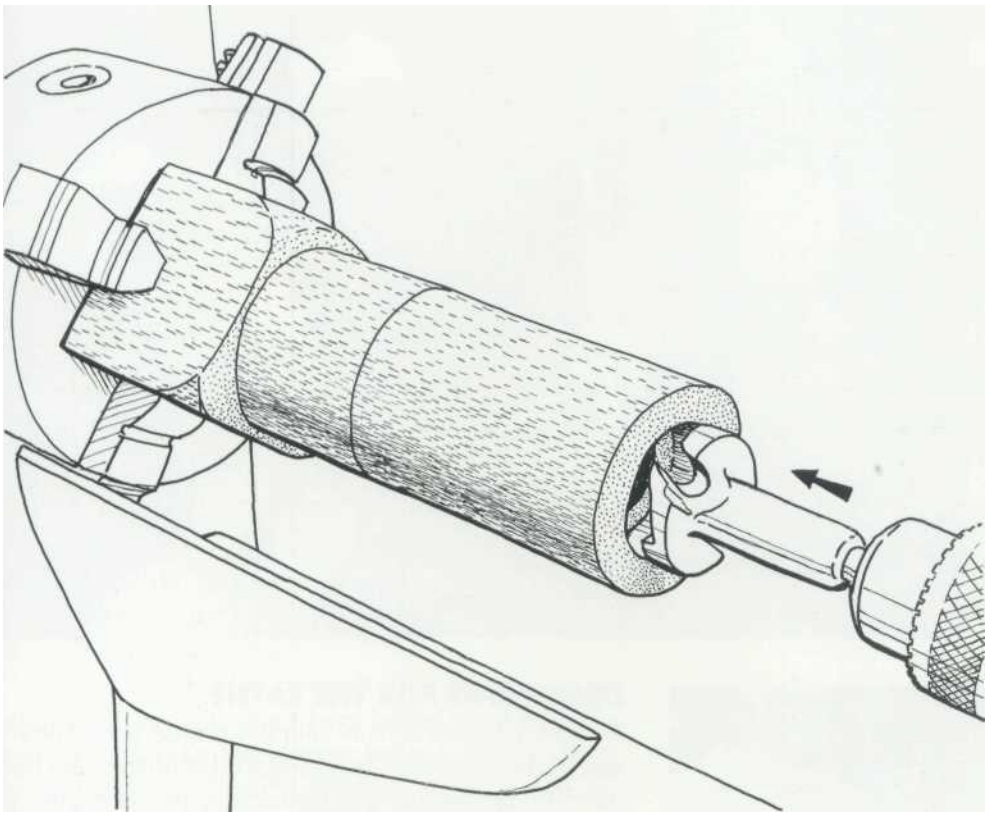
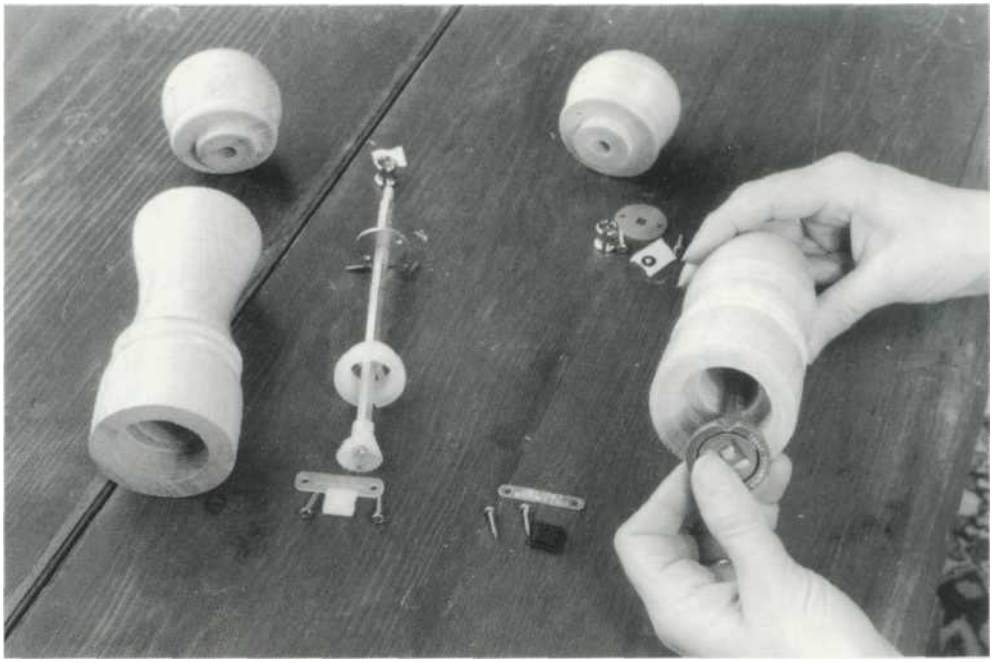


2 Bore two holes into the bottom of the mill—the first hole at 1/2″ in diameter and 1/2" deep, followed by the second hole at 1 1/8" in diameter and as deep as it goes.

3 Having more or less turned the capstan to shape, fit it in the chuck and bring it to a good finish. Run a 3/8"-diameter hole through the workpiece.

4 Fit the whole works back on the lathe and sand and burnish to a good smooth finish.

5 Slide the mill mechanism up through the body and fix with the little bar and a couple of screws.



6 Having screwed the ring washer on the capstan spigot, slide the capstan on the threaded rod and fit with the fancy head screw.

DESIGNING FOR THE LATHE

Designing for the lathe is uniquely problematic. The success of the design not only hinges on aesthetics and function but also on the turning techniques. Of course, the same goes when you are designing a chair or whatever—you still have to make decisions about the tools and the techniques—but with turning, the tools and the techniques are paramount. Also, the design solution is very closely related to method. In chairmaking, the balance of concern is perhaps equally distributed between aesthetics, function and technique; with wood turning, the technique concerns far outweigh all others. In fact, when I'm designing for the lathe, my big worry is not whether it looks good or if it functions. Rather, I'm concerned with how I will hold, secure and approach the workpiece while it is being turned, and whether it is safe.

When I'm designing for wood turning, I always run through the following little how-will-I-do-it checklist:

■ Is the lathe powerful enough? Will the motor size hap pily shift the weight of the wood?

■ Is the distance between centers long enough to accom modate the design?

■ Is the radius of swing big enough? (Meaning, is the distance between the center of spin and the top of the bed great enough?)

■ How am I going to hold the wood? Am I going to use the four-jaw chuck, the face plate, the screw chuck, the pronged center, or what?

■ Will I turn multiples in one piece to be cut apart or as individual units?

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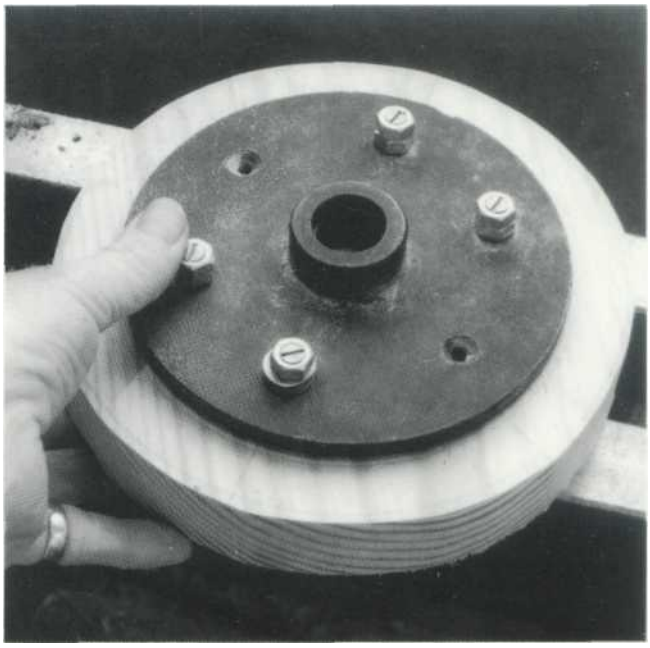
■ Will 1 need to use a drill chuck in the tailstock mandrel?
■ Will I need to use special drill bits with extension pieces?
■ Will I turn the item over the bed of the lathe? Or will I use the outboard bowl-turning option on the back of the lathe?
■ Is the chosen wood type available in the size and quality I need? Will I need to laminate up?
■ Is the wood the traditional choice for a turning of this size and character?
■ Will 1 need to use special tools other than the usual scrapers, chisels and gouges?

As you can see, at least half of the design procedure has to do with the lathe and related tooling. Of course, just about all your questions are answered if you want to turn something like a baseball bat—your only worry is length—but if the turning is more complex with maybe two component parts that fit together, then it's not so easy and needs thinking about.

Let's say, for example, that you have set yourself the design problem of turning a large lidded container—the biggest diameter possible on your lathe—a form about as high as it is round. The first thing you do is measure the radius of swing and double it. If your lathe measures 3" from the center of the headstock down to the top face of the bed, you can reckon on a diameter of no more than 6". So, you are turning a container about 6" in diameter and 6" high.

Next, you have to decide how the block of wood is to be held and the order of work. Though there are many



ways of proceeding, I usually turn the wood down between centers—meaning the outside profile—then hold the wood in the four-jaw chuck while I hollow-turn the center. When I have cleared the waste from inside the container and maybe turned the rim, I then change the container around on the chuck—so that it is held by its rim—and finish up by turning the base.

What else to say, except that you must always think well ahead before you put tools to wood. And of course, as with all potentially dangerous machinery, you must always be wide awake and ready for the unexpected.

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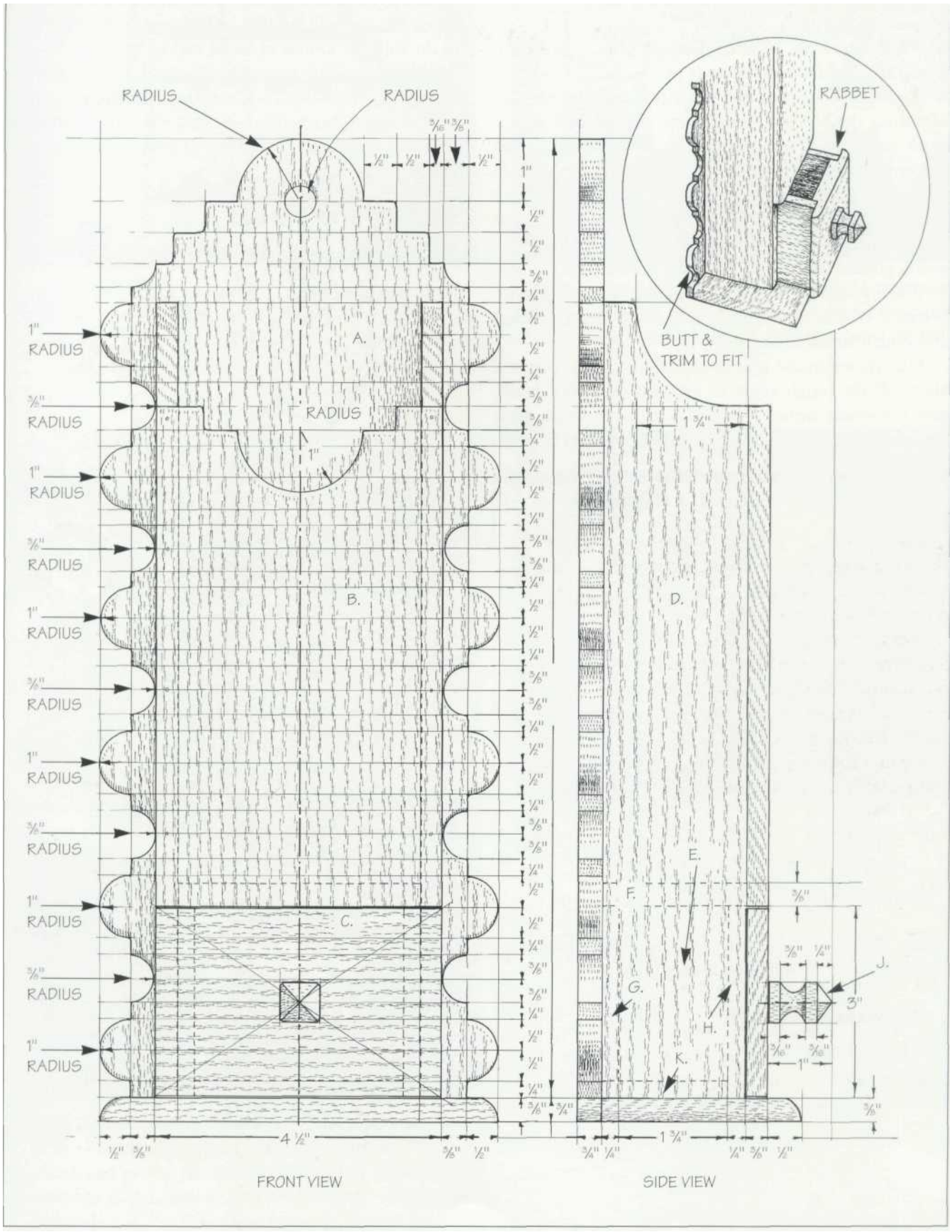
Folk Art Pipe Box

I wonder why our great-great-great-grandparents put such a huge amount of energy and enthusiasm into making pieces of woodwork that were used for everyday chores. Okay, so they had to have such functional items as dough troughs, candle boxes and flour bins. But remembering that every stick of wood had to be laboriously cut, planed, fretted and finished by hand, why did they put extra time and trouble into decorating their woodwork with so many fancy curlicues?

If you want to try your hand at a piece of woodwork that perfectly illustrates this point, then this pipe box is for you. Inspired by an English eighteenth-century folk art original, boxes of a similar type, design and construction can be found all over—in England, in Wales, in Scotland, in America—in fact, just about anyplace people smoked long-stemmed clay pipes. The design of the box is beautifully fitting for its task. The pipes fit in the top half of the box, the "makings" fit in the little drawer, and the whole works hangs on the wall alongside the fireplace.

As to the fancy compass-worked edge design, it can be found on all kinds of eighteenth- and nineteenth-century woodwork—on everything from overmantel and cupboard shelves to bench trim, door surrounds and plate racks.



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MAKING THE PIPE BOX

Having set the wood out with all the dip-and-arch curves, fret out the design.

When you have made all the component parts and pencil labelled them so there is no doubting what goes where and how, then comes the tricky, sticky-finger task of putting the box together. I found that the best way to work was to drill, pin and glue the components in the following order: (1) the main backing board to the main baseboard; (2) the side boards to the backing board; (3) the inside-box piece that forms the bottom to the pipe part of the box; (4) the front to the box. And lastly, I glued, pinned and adjusted the little drawer to fit the box.

When you come to the little drawer knob, all you do is trim a 3/4" X 3/4"-square section of wood down to shape and plug it into a drilled hole.

Finally, when the glue is completely dry, trim and shape all the rough edges to a slightly rounded finish, give the whole works a rubdown with the finest-grade sandpaper, and then lay on a thin coat of wax or varnish.

MATERIALS LIST

BOX

A Back board (1)	⅜"×6¼"×15½"—we used English oak throughout
B Front board (1)	⅜"×4½"×7⅞"
C Side boards (2)	⅜"×2¼"×12½"
D Drawer sides (2)	¼"×3"×2¼"
E Inside-box bottom (1)	⅜"×2¼"×3¾"
F Drawer back (1)	¼"×3"×3¼"
G Drawer front (1)	⅝"×3"×4½"
H Box base (1)	⅜"×3⅛"×6¼"
I Knob (1)	⅝"×⅜"×1⅜"
J Drawer base (1)	¼"×2"×3¼"

Note that all measurements are to the mark—meaning they make no allowance for cutting waste.

HARDWARE AND EXTRAS

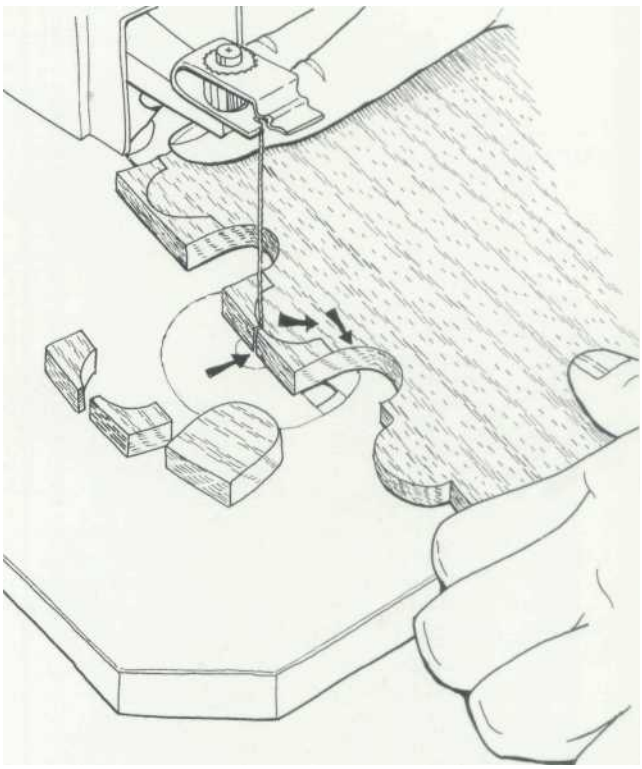
K Copper panel pins

L PVA glue

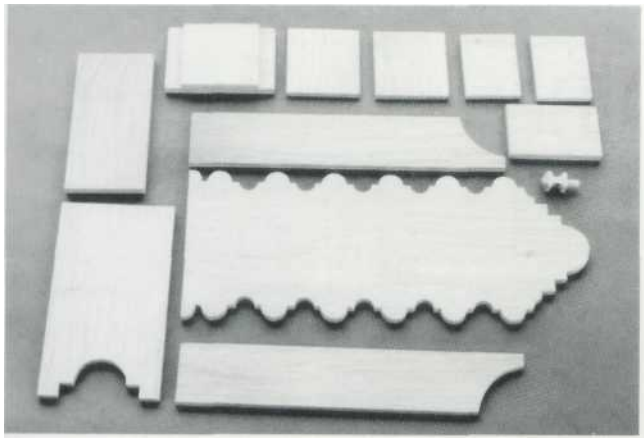
SPECIAL TIP

If you have a good close-up look at museum boxes of this character, you will see that a good part of the charm has to do with the choice of wood and the degree of finish. For example, while a good native wood looks beautifully fresh and understated—something like cherry, maple, pine or oak is just perfect—a fancy wood like mahogany or one of the exotic African woods tends to look too precious or "overdressed."

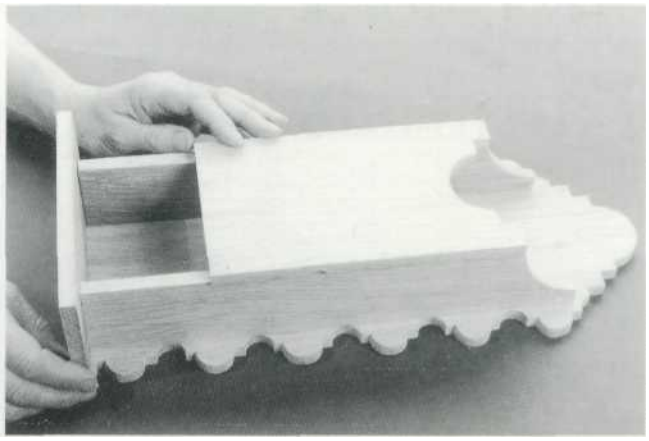
STEP-BY-STEP STAGES



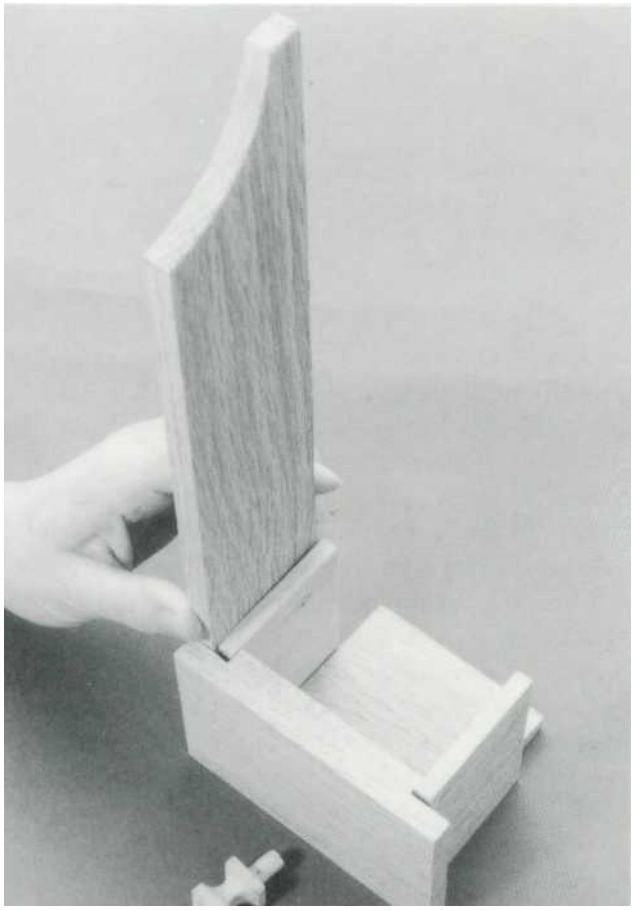
To work the fancy edge, start by cutting out all the deep concave U shapes—along the whole length of the wood—and then fret out the remaining convex forms. If you look at the arrows, you will notice that I always work in the direction of the grain—that is, two cuts that run down-and-out from the peak of the little bridge shape.



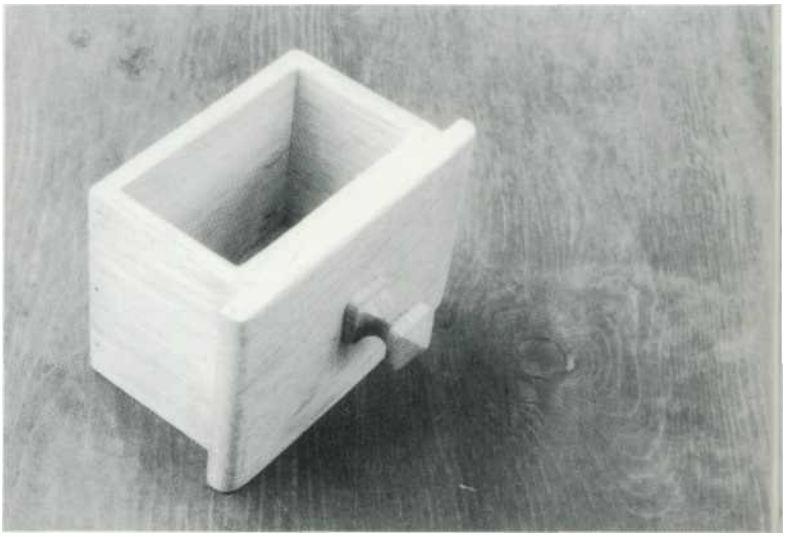
2 Having made all the component parts, pencil label them so that you know precisely how they fit one to another. If one side of a part is more attractive, or damaged, then now is the time to make decisions as to its placing.



3 Do a trial fitting to make sure that you haven't made any mistakes. Test for the squareness of the butting edges and mark in the position of the nail/panel pin holes.



4 Do a trial fitting of the sides of the box and the sides of the drawer. If necessary, you can trim back the rabbet and/or the thickness of the wood. Establish the position of the drawer pull by marking with crossed



5 Here's the finished drawer—all glued, pinned and rubbed down. Putting the drawer together is a little bit tricky, not because any single cut is complicated, but because the total form needs to be true, square and a good fit.

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Laminated Jewelry Box

This project draws its inspiration from the English decorative woodworking technique known as Tunbridgeware. This ware is characterized by small items that give the appearance of being worked with delicate tessera inlay. The technique involves gluing colored sticks of wood together in bundles and then repeatedly slicing, repositioning and re-gluing.

With this little box, the slicing and laminating technique is used in conjunction with what has come to be called "band saw joinery."

MAKING THE LAMINATED BOX

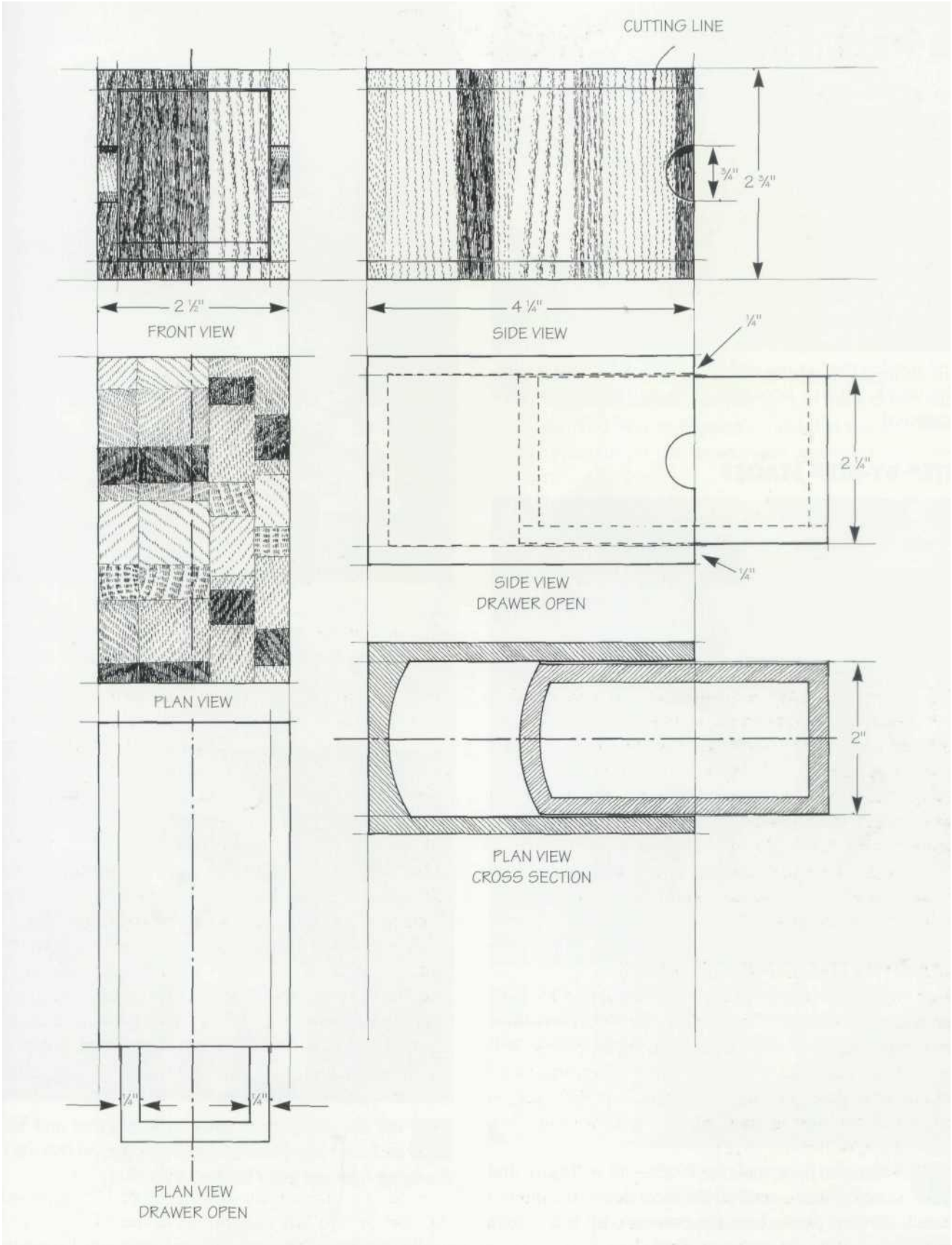
First and foremost, you have to understand that with this project there are several steps along the way where there is a high risk of the whole thing falling to pieces. This being so, we decided at the outset to work on two boxes at the same time, just in case of mistakes. Well, as you can see in the photographs, we got so far with one box and—Splap!—it came to grief.

When you have studied the working drawings, gather your chosen offcuts, and plane them down to smooth-sided sections. Stick them together side by side, like a long fence. When the glue is dry, plane both sides of the fence, cut it into short lengths, and then re-glue the resultant lengths into a layered sandwich. Continue slicing, planing, gluing and laminating, until you have what you consider an interesting multicolored brick. And of course, the more you slice and laminate, the smaller the design and the greater the complexity of the pattern.

Plane your brick to size so that it is *2 1/2"* X 2 3/4*"* in section and 4" long, with all six sides being smooth and at right angles to each other. Pencil label the various sides "top," "bottom," "back," "front," "left side" and "right side."

Use the band saw to cut a 1/4" slice from the "top" and "bottom," label the slices and put them carefully to one side. This done, set the shape of the drawer out on the rough face of the block, and use either a fine-bladed band saw or a scroll saw to cut it out. Next, slice the bottom off the drawer, label it and put it to one side. Then use the scroll saw to clear away the waste from what will be the inside of the drawer. While the saw is handy, cut away the two finger holes and run a cut straight down back-center of the shell-like piece that wraps around the drawer.

When you have made all six component parts—the top and bottom slabs of the brick, the all-in-one-piece back and sides that has been cut into two halves, the



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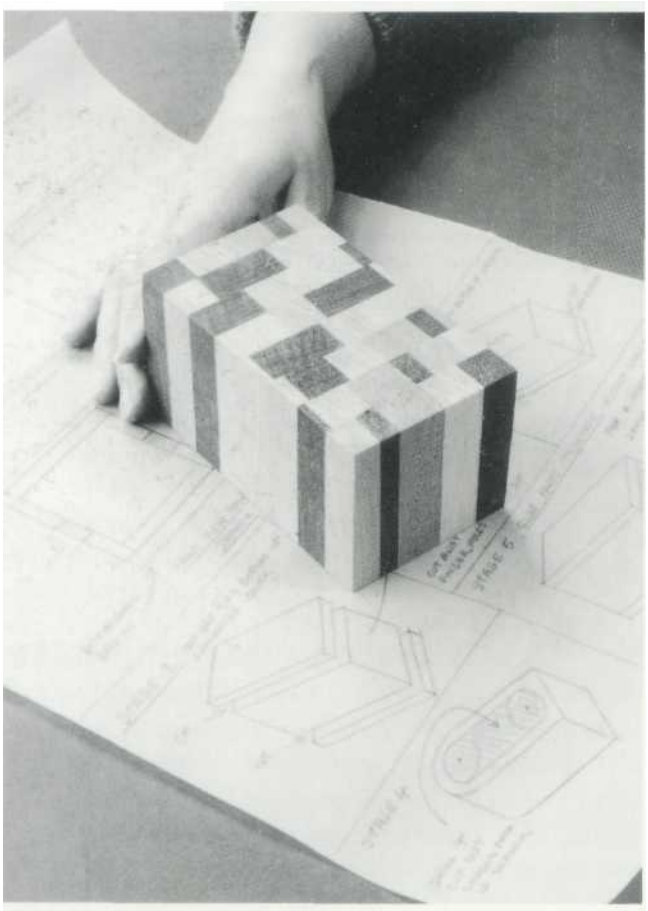
drawer with the inside cut away, and the bottom to the drawer—take the finest-grade sandpaper and rub all the sides and faces down to a smooth finish. Be careful that you don't blur the corners.

To put the little box together, start by gluing the base onto the drawer. Then smear glue on mating faces and reconstruct the block so that the drawer is nicely and closely contained. Finally, when the glue is dry, sand and finish the box.

SPECIAL TIP

If **you** like the idea of this project and want to try something a little more complex, you could experiment with cross-laminating. For example, you could turn the slices around at the sandwiching steps so that all faces of the brick show end grain. Then again, you could try swapping and turning the bottom and side slices of the box so that the block pattern becomes even more complex and staggered.

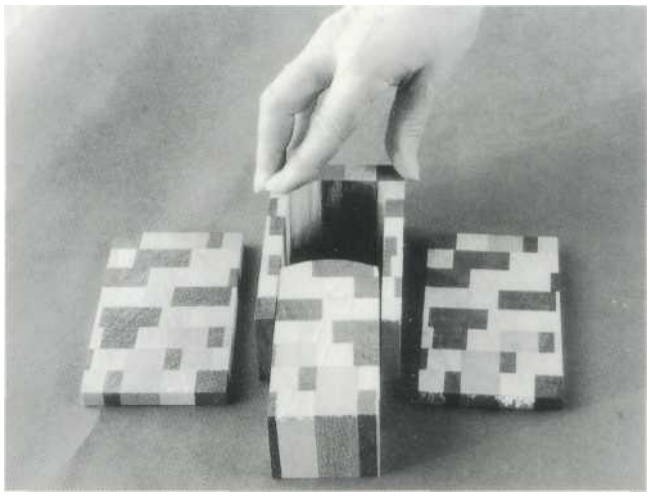
STEP-BY-STEP STAGES



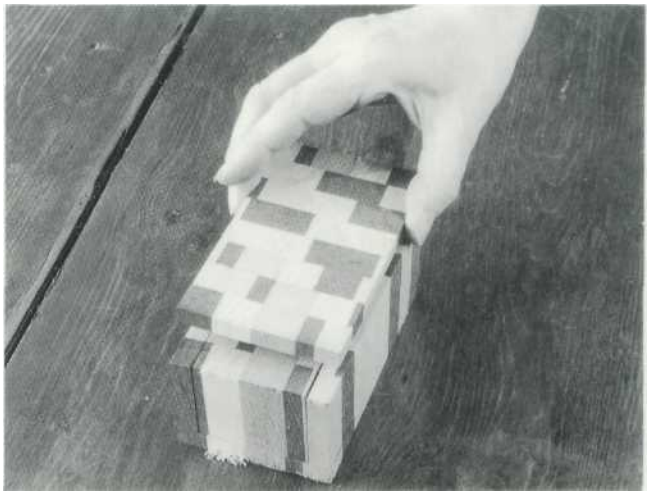
1 When you have made the block—all well glued and sawed to size—sand all the faces down to a smooth finish. Do your best to keep the corners crisp and at right angles.

MATERIALS LIST

Box	A selection of contrasting offcuts all sawed and planed—we used American walnut, oak, cherry and tulipwood—at about ½" thick and at various widths.



2 Saw slices off the top and bottom of the block and cut out the shape that goes to make the drawer. Be mindful that the drawer surround—meaning the piece that you see me holding—is very fragile at this stage and liable to break apart at the corners.



3 Put the component parts back together and label each and every face and mating edge, so there is no doubting how the parts fit one to another.

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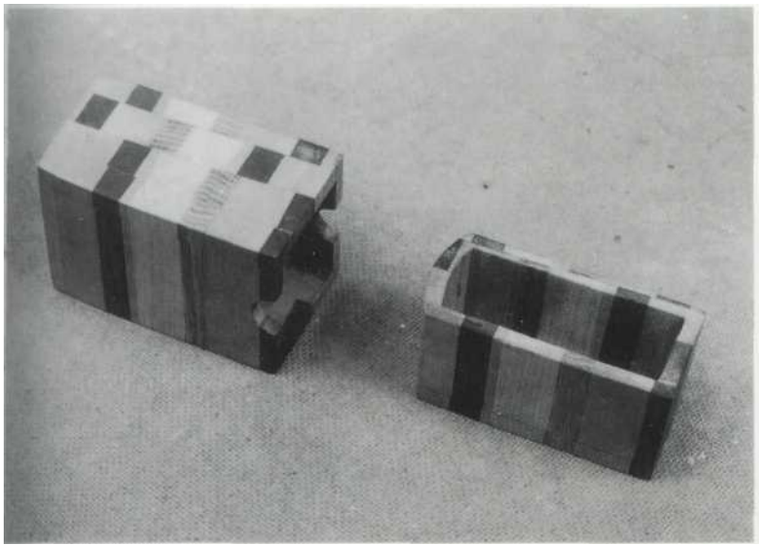
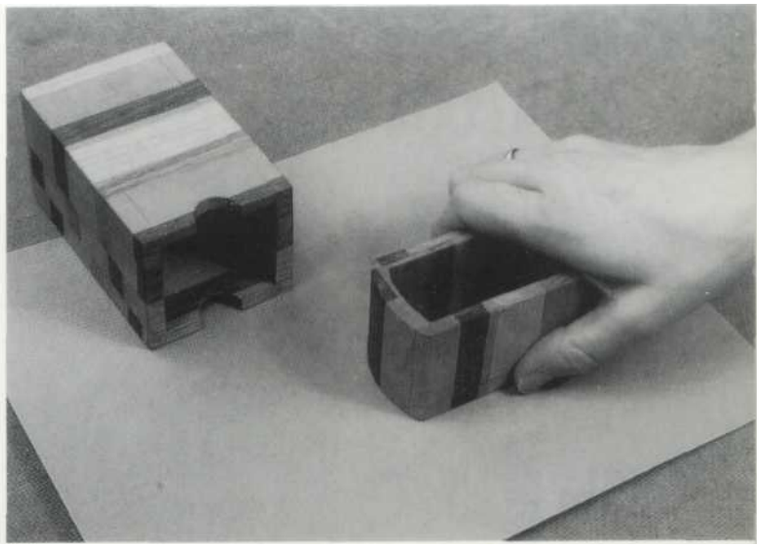
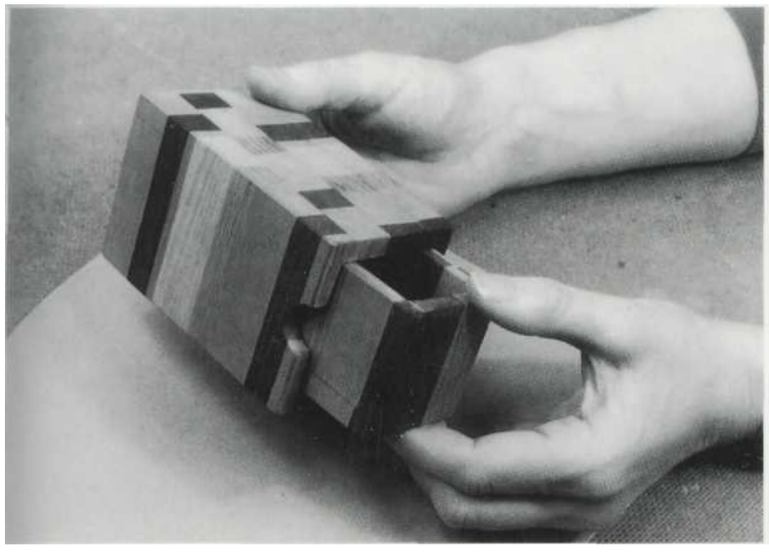


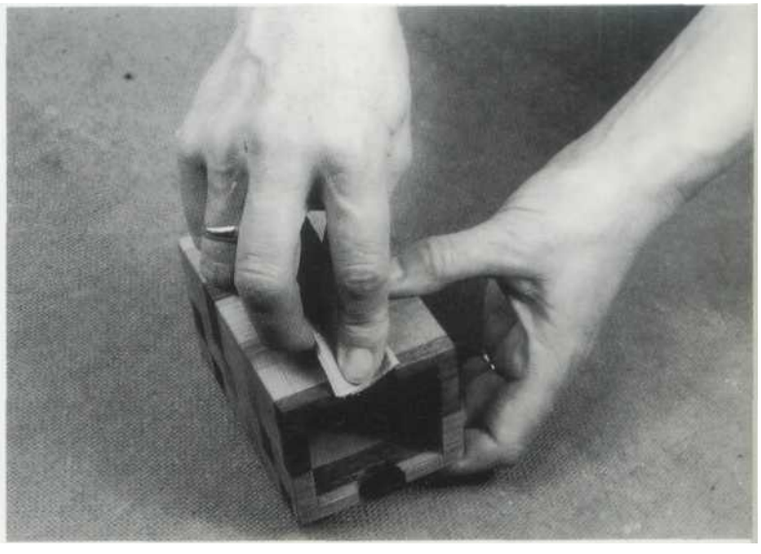
4 Having sliced off the bottom of the drawer block, saw out the inside-drawer waste and then glue the base back on the drawer. And just in case you have noticed that this photograph shows another block, the sad truth is the original block fell to bits when 1 was cutting the drawer. I think the problem was that I was a bit anxious and heavy-handed, and the glue hadn't quite cured.



Sanding the various faces is a very slow business for the simple reason that you have to work slowly and with care. You have to be most careful that you don't put undue pressure on the drawer—no squeezing the sides together.



6 If you find that the drawer is a somewhat loose fit, it's a good idea to give the inside of the box a couple of coats of sealer and then sand back to a nice push fit. The best procedure is to sand a little and test the fit, then sand some more, and so on until you are satisfied.



Sand the finger holes to a rounded finish. You have a choice at this stage . . . do you want to round and blur all the corners, or do you want to keep them sharp?

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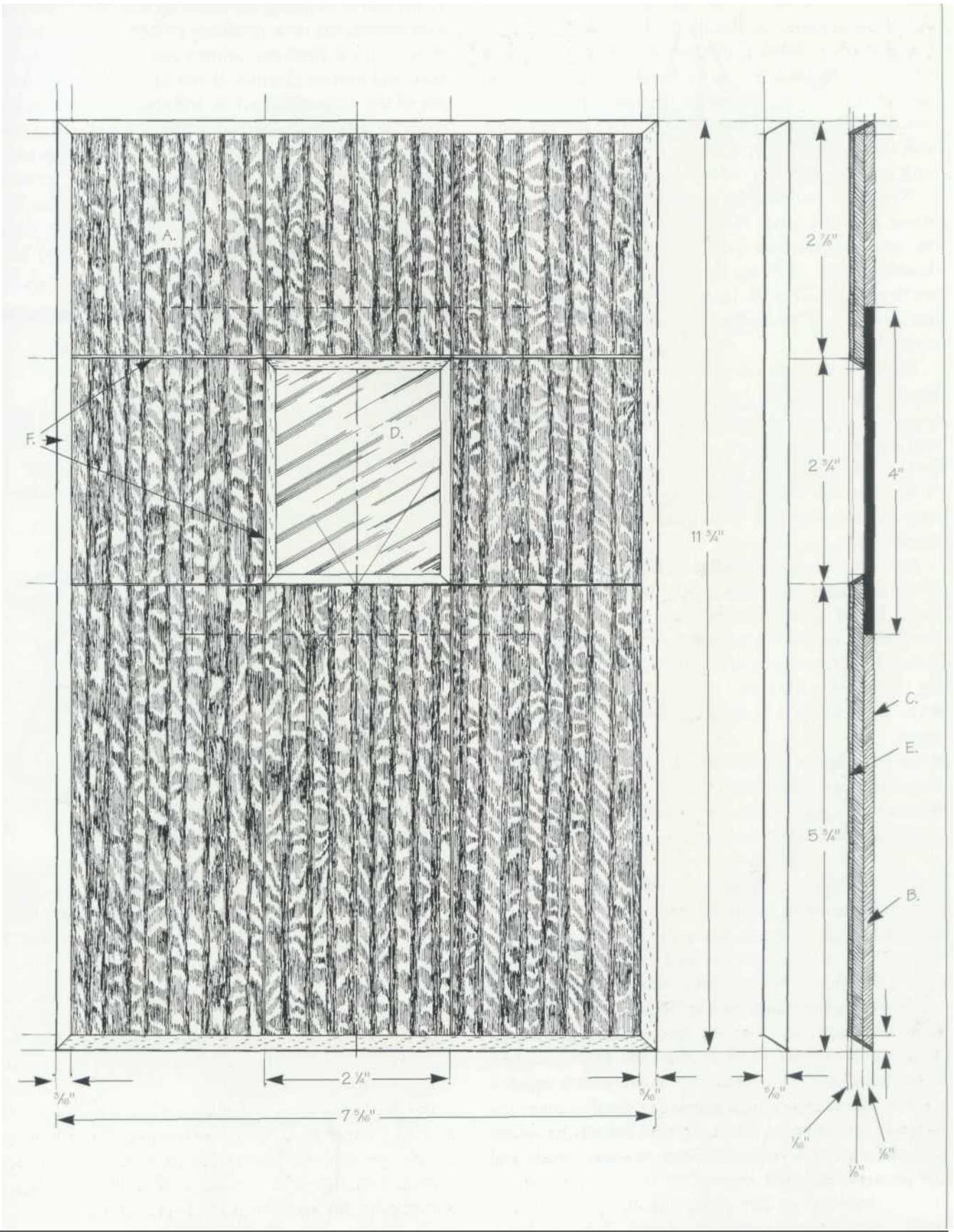
Marquetry Mirror

About five years ago, my son Glyn made a marquetry mirror for an English magazine called the *Woodworker*. It was a real success and there was lots of interest. This mirror draws its inspiration from that project. At first glance, this mirror appears to involve an incredibly complex and fine marquetry technique—very fine hairline inlays and a multitude of cuts. Certainly it is a most delicate and exquisite item, but appearances are not always what they seem! The marquetry surface is, in fact, made up from a sheet of specially printed and pressed flexible veneer, while the hairline inlay is made from strips of sycamore veneer glued to the kerf face. As to the technique, it's no more than a few saw cuts and a bit of ironing.

For the actual shape and character of the mirror, there are any number of exciting possibilities. You can chop and change the veneer around to create different effects; you can rearrange the saw cuts so that the little "window" is triangular, hexagonal or star-shaped. In fact, you can go for just about any shape that takes your fancy.


A.
D.
F.
11 3/4"
2 1/8"
2 3/4"
4"
C.
E.
5 3/4"
B.
2 1/4"
3/16"
3/16"
3/16"
7 5/16"
1/8"
1/8"
1/8"

MAKING THE MIRROR

Before you do anything else, you need to play around with the materials—the flexible veneer and the gluefilm. The gluefilm is wonderfully easy to use. All you do is position it paper-side up on the baseboard and iron it in place with a hot iron; remove the backing paper and position the marquetry on the gluefilm; cover the assembly with the backing paper and run the hot iron back and forth until the glue has melted.

When you understand how the gluefilm technique works, clear the bench ready for action. Start by cutting the two boards to size—the top board and the mirror thickness board. Then use the gluefilm to bond your chosen flexible veneer to the front face of the top board. And just in case you are wondering, yes, it is as easy as it sounds!

Having used a pencil, ruler and square to draw the lines of the design on the veneered surface so that they run off the edge of the board, sit awhile and consider your next move. As you can see, all you need to do is make four cuts straight across the board and at a mitered angle of 30°. Then fill the resultant saw-cut kerfs with a glued strip of veneer so that the angled veneer becomes the beveled edge.

Now there are two ways forward. You can either do as we do and make one cut straight down the length of the board, fill the cut up with the veneer strip and move onto the next cut, or you can make all four cuts and then fiddle about gluing up the whole assembly. Either way, the gluing procedure is the same.

- Use the scroll saw to make the beveled cut across the board.
- Use the gluefilm to bond the strip of sycamore veneer to one face of the kerf bevel.
- Smear PVA glue on the face of the sycamore strip and push the other side of the board in place.

Then continue making beveled cuts with the scroll saw, sticking veneer strip to one side of the bevel, sticking the other side of the board in place, and then on to the next cut until the task is done. The trick is to finish up with a mirror hole that is nicely beveled on all four edges.

When the glue is dry, use a small plane and the finest-grade sandpaper to clean the whole works down to a smooth finish so that the edges of the veneer strips appear as fine inlay lines. This done, glue the two boards together to make the recess for the mirror tile. Finally, miter the edge of the two-board thickness, trim it with the veneer strip, burnish the whole works with beeswax polish, and the project is finished.

SPECIAL TIP

To my way of thinking, the whole art and craft of working with veneers has been revolutionized by the introduction of two miracle products: printed and pressed flexible veneer, and iron-on gluefilm. If you have trouble obtaining one of the products, don't be tempted to use traditional veneer and hot-melt glue, but rather visit a specialist supplier and ask specifically for the products by generic name. You need "thermoplastic gluefilm," and "pressed and printed flexible veneer." Flexible veneers come in a whole range of designs and colors, everything from imitations of exotic veneers to designs that look as if they have been woven.

MATERIALS LIST

A Front board (1)	⅛″ ply ×7 5/16″ ×11¾″
B Mirror thickness board (1)	⅛″ ply (same thickness as the mirror tile) ×7 5/16″ ×11¾″
C Backing paper (1)	6″ ×6″—sticky-back paper or plastic to hold the mirror secure
D Mirror tile (1)	4″ ×4″-square tile
E Veneer (1)	printed and pressed flexible veneer 12″ ×12″—this allows for cutting waste
F Inlay (1)	sycamore veneer 14″ ×10″ —this allows for a good amount of cutting waste

HARDWARE AND EXTRAS

G Thermoplastic gluefilm (1)	18″ ×18″
H PVA glue	

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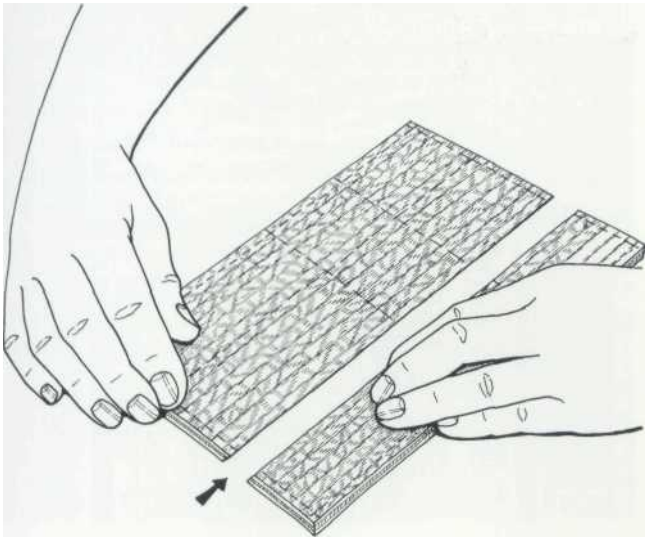
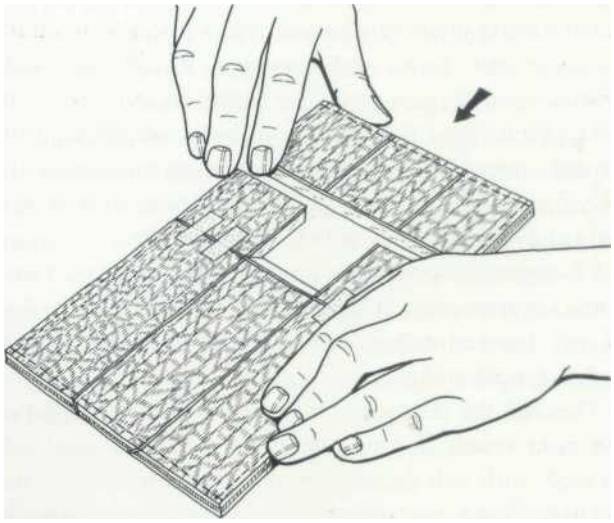
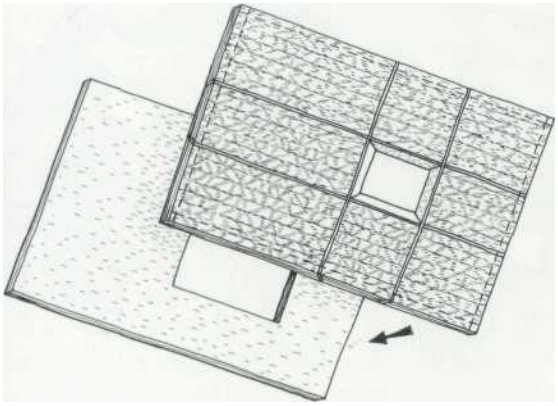
STEP-BY-STEP STAGES



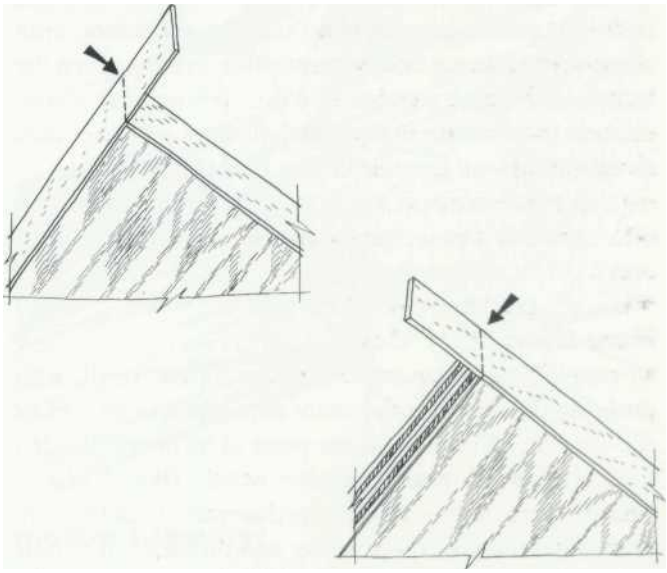
1 Set the saw table to a tilt angle of 30° and run a saw cut right across the length of the board. Then, glue a strip of veneer on the sawed edge and glue the two parts of the board back together.



2 Continue running straight saw cuts across the board and filling the kerf with veneer until the design is complete. If you do it right, the procedure will automatically result in the mitered edges of the mirror hole or window being veneered with the strip.



3 Glue the backing board in place so that you have the thickness of two boards. Then run a beveled cut around all four sides of the frame.



4 Glue the strips around the mitered edges and trim and sand the corners to a crisp finish.

MORE ABOUT THE CRAFT OF MARQUETRY AND INLAY

If you have enjoyed this project and want to know more about the craft of inlay and marquetry, then the following brief history will give you some useful leads.

Marquetry and inlay were originally inspired by the ancient craft of "intarsia"—the making of mosaics by the inlaying of precious and exotic materials into and/or onto a groundwork of solid wood. The Egyptians decorated much of their woodwork with inlay. In fact, in the tomb of the Egyptian king Tutankhamen, just about all the furniture is covered with an inlay made up of little briquettes of wood, gold and ivory.

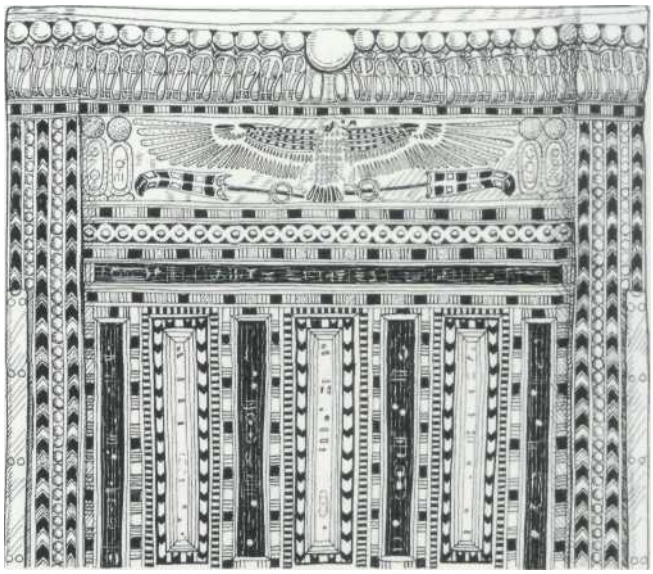
Through the centuries, in Egypt, Rome, Persia, Japan and right across Europe, the craft of inlaying gradually evolved, with rich patrons employing craftsmen to painstakingly cover base woods with rare and exotic woods. The craft involved importing rare woods, slicing the wood into little chunks, and then setting the chunks or briquettes one at a time into the base wood. The process of inlay was massively expensive in time and materials.

And so it might have continued had not some tired and weary woodworker—sometime toward the end of the sixteenth century—invented the jigsaw. From then on, 1 he whole process became swifter and more efficient, until about the beginning of the seventeenth century, when the technique became so improved and refined that woodworkers were using thin sheets of wood—by this time called veneer—to glue directly to the base wood.

The craft as we now know it can be divided into four areas of study—veneering, parquetry, boulle marquetry and window marquetry.

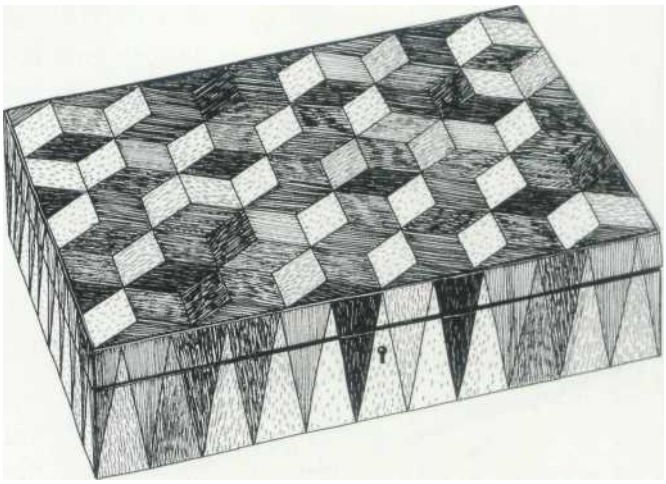
Veneering

In simple terms, the craft of veneering has to do with covering base wood with a more attractive species, to fool the eye into believing that the piece of furniture or other Hem is made of more expensive wood. Though at one time this area of the craft fell into disrepute, with the term "veneer" coming to mean tricky and/or cheap, it is now seeing a revival. Current thinking is that one way of saving rare and precious tree species is to make a little go a long way. For example, it is now possible to build a whole piece of furniture from a man-made sheet-wood material like MDF (medium density fiberboard), and then cover it with a pressed-and-pnnted flexible veneer—as in this project—or with plastic veneers or thin sheets of rare wood. One look through a batch of current woodworking magazines will bear out the fact that the time is fast coming when some woods will be so rare and costly that woodworkers will have no choice but to use thin decorative veneers on base-wood grounds. Interesting isn't it!



EGYPTIAN INLAY

Detail from the back of Tutankhamen's ceremonial chair—inlayed with exotic woods and precious stones.



NINETEENTH-CENTURY PARQUETRY

A classic *example of a parquetry box—made in* ***Tunbridge*** *Wells, England, in the middle of the nineteenth* ***century.***

Parquetry

Squares, checkerboards, counterchanges, triangles, diamonds and zigzags—parquetry is the art and craft of math, geometry and the straight line. While marquetry involves pictures, patterns and all manner of wavy-line imagery, parquetry concentrates on straight lines and geometrical patterns.

Many American marquetry craftsmen think of parquetry as being similar to fabric patchwork. It's a good comparison. If you think of the geometrical patterns that make up a quilt, and if you go on to think of this same pattern in terms of tiles of veneer spread out over a piece of furniture, or maybe over a floor, then you have a parquetry. If you enjoy playing around with rulers and set squares, and if you enjoy logic, order and straight, crisp lines, then you will enjoy parquetry.

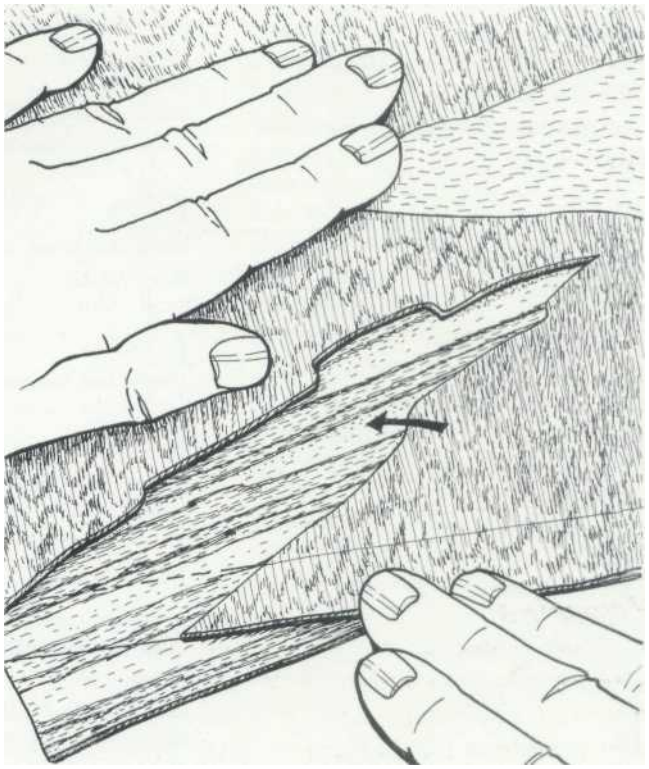
Boulle Marquetry

Boulle is a type of marquetry that was popular in France in the seventeenth and eighteenth centuries. The technique was named after Andre Charles Boulle, a French marquetry craftsman under King Louis XIV. Now known as boulle, boule, or even, buhl, the technique might best be described as getting two designs for the price of one. Traditionally, the boulle technique involves setting two thin sheets of contrasting material together—usually brass and an exotic wood—and then cutting through both sheets at the same time to create a number of pairs of identical cutouts. For example, if you have two sheets of veneer sandwiched together—one black and the other white—and you cut a circle shape through both sheets and then swap the cutouts around, you will have a black sheet with a white circle at its center and a white sheet with a black circle. If you were to continue cutting out more complex shapes and swapping them around, you would finish up with two identical counterchanged designs—one white on black and the other black on white. If you sandwich four sheets of veneer together, then the technique really begins to lift off. If you enjoy intricate sawing, and exquisite pattern work—say on small boxes and the like—and if you like the notion of using up every last piece of veneer, then perhaps this is a technique that you need to explore.

Window Marquetry

Window marquetry, sometimes called picture marquetry, involves pencil-press, transferring the design through to a sheet of scrap veneer, then cutting out the elements of the design one step at a time and replacing them with more decorative veneers.

For example, if you draw a picture of an old sailing ship on the scrap veneer and cut out, say, one of the sails so that you have a hole, then you can slide the hole over your choice veneer and try out various grain patterns. When you have selected the veneer, you cut a piece to fill the hole. Then, you repeat the procedure with all the other elements that go to make the design—the sails, the masts, the hull, the clouds, and so on. Of course, if you continue in this manner, you will eventually finish up with a situation where just about all the base veneer has been replaced by little cutouts of contrasting veneer. When this point is reached, the resultant design can be mounted like a picture or built into something like a coffee table. Great fun!

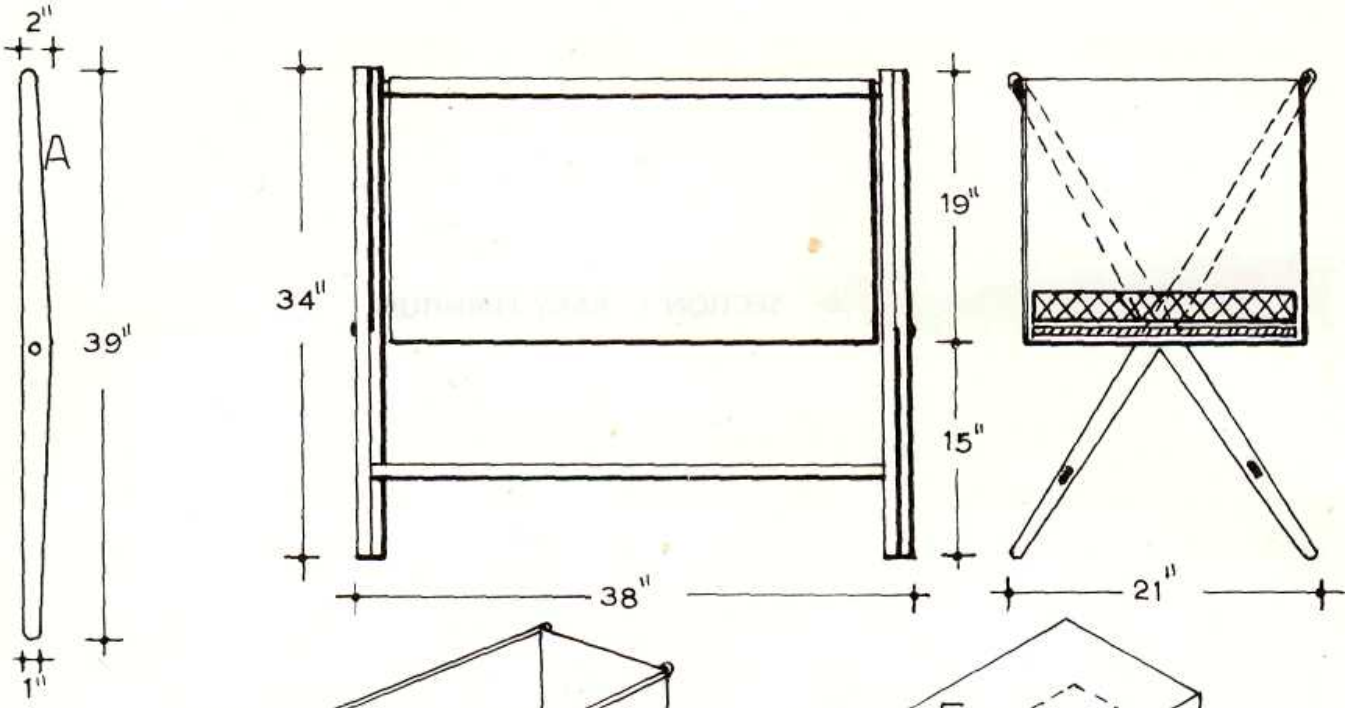


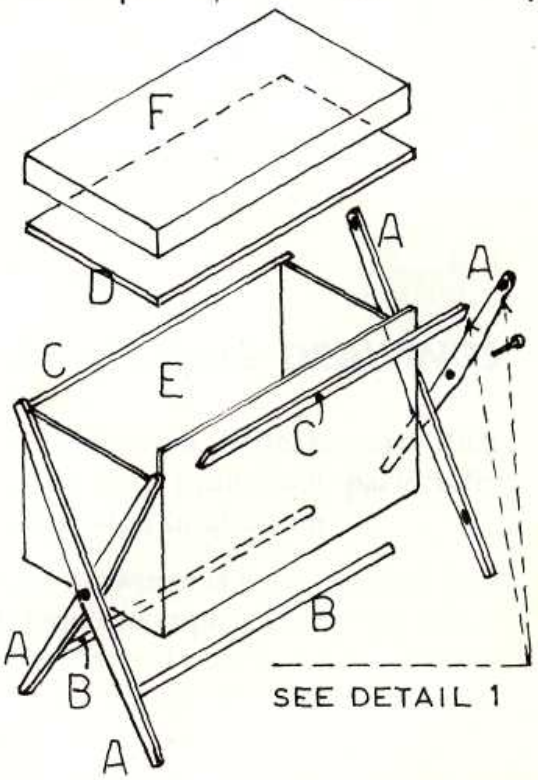
WINDOW MARQUETRY

The technique is beautifully simple and direct. All you do is cut out an element of the design and then [ill it with choice veneer.

1.1 BASSINET

This basket-bed for infants is easy to make, and easily moved from room to room. The crossed wooden legs fold to permit storage; the mattress, too, can be folded for storage or transport.

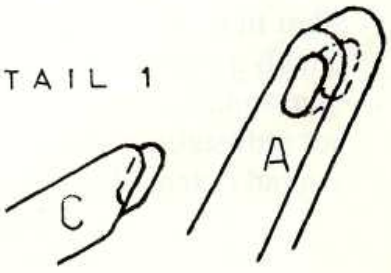




List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length		
A	4	legs	1	2	39
B	2	stretchers	¾	1¼	37
C	2	rails	¾	1¾	37
D	1	plywood panel	⅜	18	33
E	1	plastic sheet		36	80
F	1	foam rubber mattress	3	18	33

DETAIL 1



Instructions for Assembly

1. Join legs (A) with bolts at center.
2. Fasten stretchers (B) and rails (C) with legs (A).
3. Apply finish.
4. Saw the plastic sheet to indicated shape and attach to rails (C).

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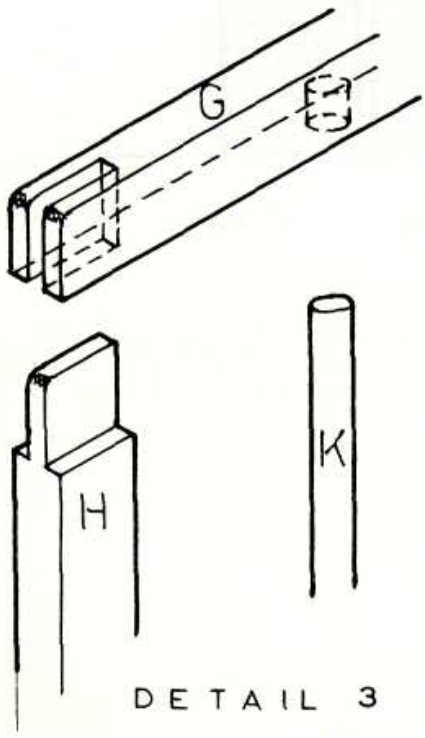
1.2 CRIB

The fixed side is placed against the wall, while the folding side facilitates making the child's bed or removing the mattress. Double-spring catches make it impossible for inquisitive fingers to unlatch the folding side. Because of the large number of parts that have to be joined, care and accuracy are required in this project.

List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness	×	width	×	length
A	4	legs	1		1½		37½
B	2	rails	1		1½		26
C	2	panels	¾		23		28½
D	2	rails	¾		5½		46
E	2	cleats	¾		1		44
F	4	cleats	¾		1		24
G	6	rails	¾		1¼		46
H	2	rails	¾		1¼		24
J	4	rails	¾		1¼		12
K	9	dowels	⅜ diam.				23
L	18	dowels	⅜ diam.				11
M	2	rails	¾		1½		46
O	2	rails	¾		1½		21
P	6	strips	¼		1½		23
Q	1	foam rubber mattress	2		23		45



DETAIL 3

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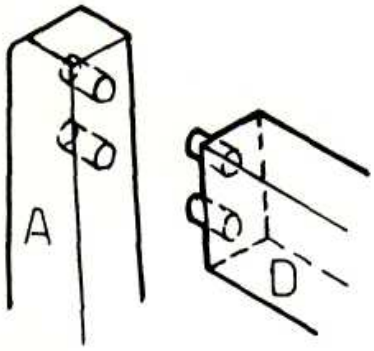
1.3 PORTABLE CRIB

Taking little room space and small enough to be wheeled through a doorway, this crib allows the very young baby to have company while Mother tends to chores in kitchen or utility room.



DETAIL 1

List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness	×	width	×	length
A	4	legs	1		2½		32½
B	2	rails	¾		5		40
C	2	rails	¾		5		20½
D	2	rails	1		1¼		22
E	8	dowels	⅜ diam.				18
F	4	rails	¾		1¼		17½
G	4	rails	¾		1¼		40
H	14	dowels	⅜ diam.				16½
J	2	cleats	¾		1		40
K	2	cleats	¾		1		20
L	1	plywood panel	⅜		22		40
M	1	foam rubber mattress	3		21		39

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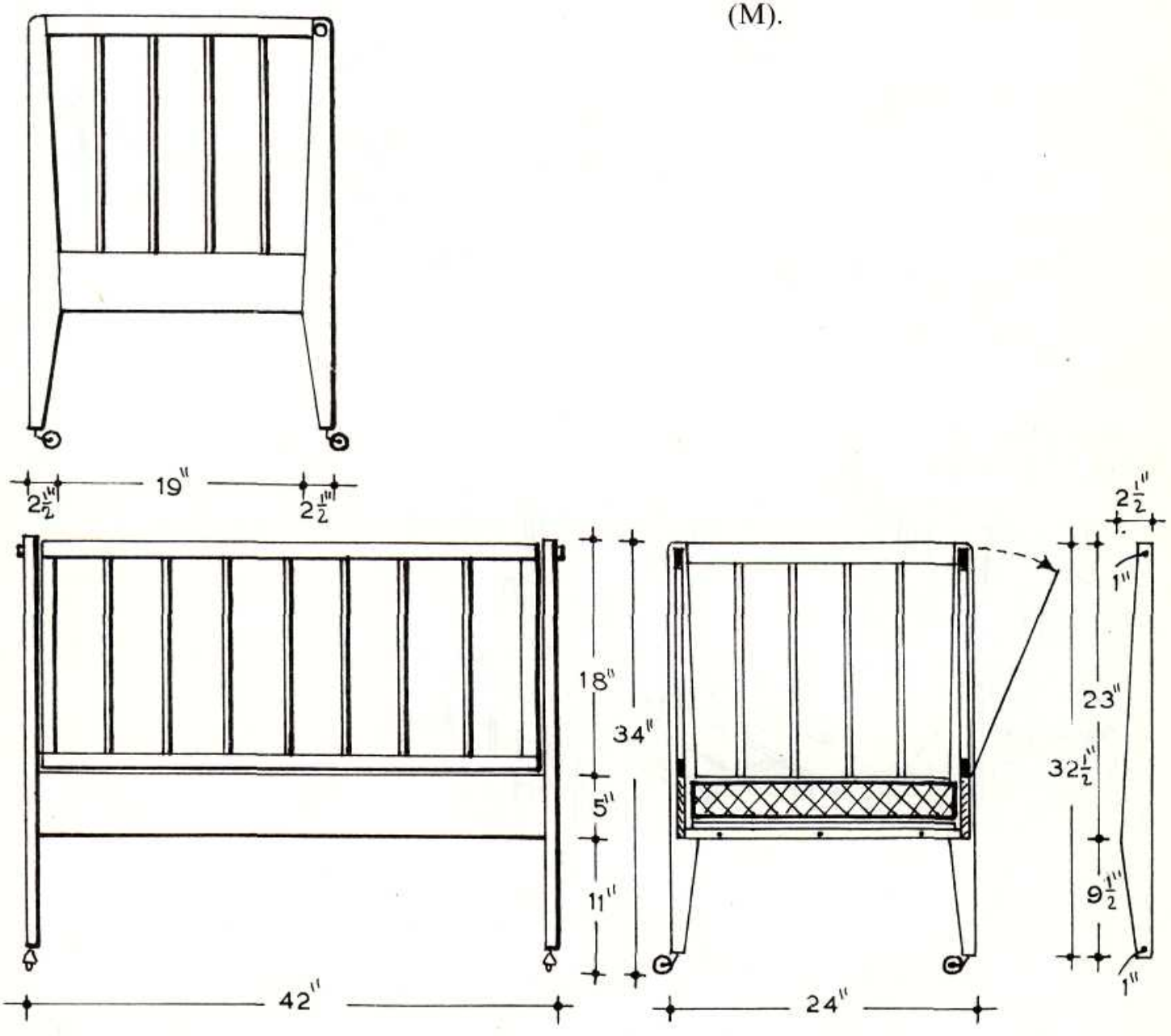
Instructions for Assembly

1. Install dowels (E) in the rails (C, D) and join rails (C) and (D) with legs (A).
2. Fasten cleats (J) and (K) to rails (B) and (C).
3. Fasten rails (F) and dowels (J) to rails (G) and attach latter to rails (B) with hinge.
4. Fasten rails (B) to legs (A).
5. Apply finish.
6. Insert bottom (L) and mattress (M).



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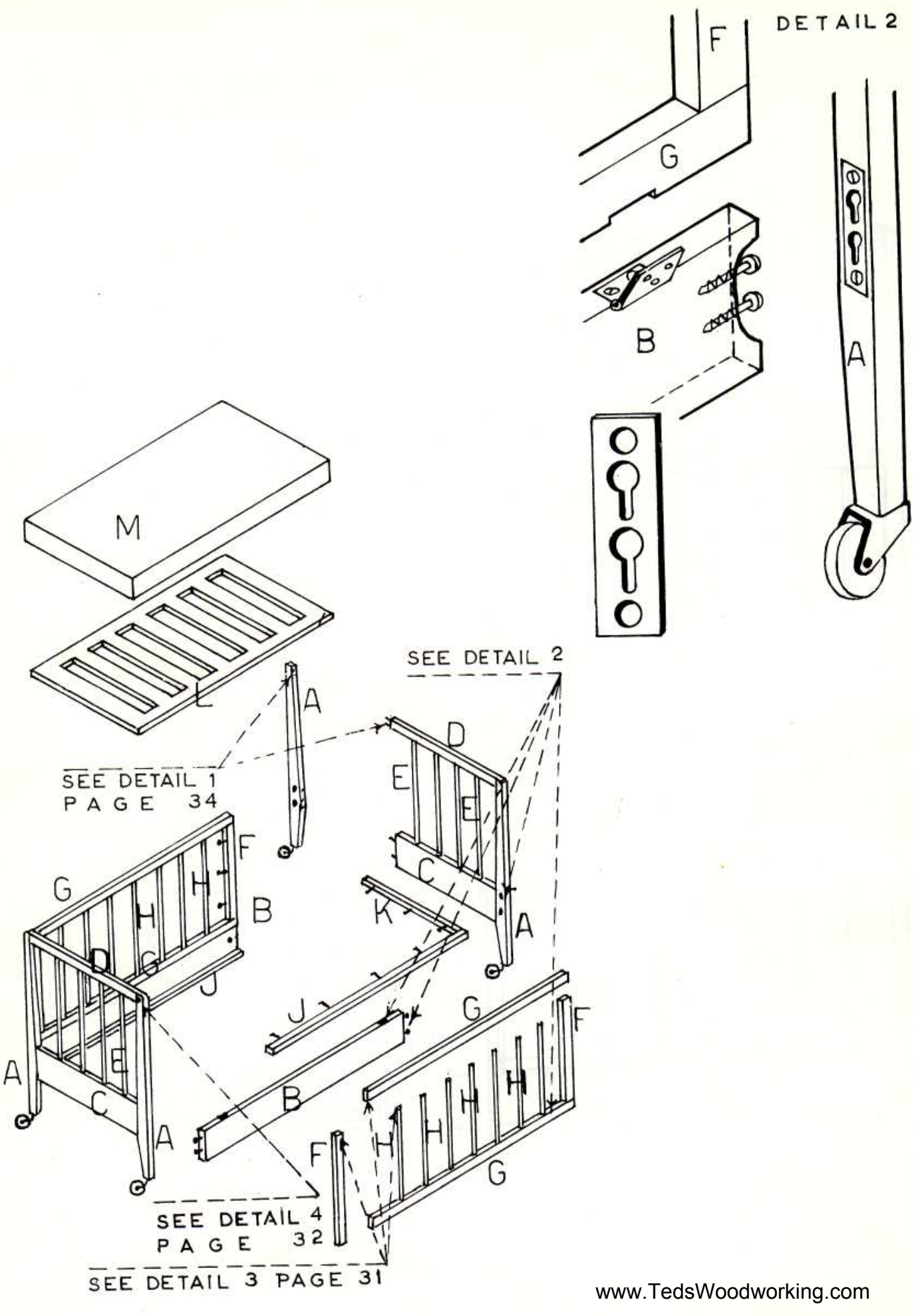

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1.4 HIGH CHAIR

A broad base and sturdy construction make this model relatively tip-proof. Any kind of finish will do for the chair, but the tray should be enameled to take repeated washing and scrubbing. The time-honored high chair makes junior a joiner at the family table.

List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness	×	width	×	length
A	1	back	½		12		13½
B	1	seat	¾		12		13½
C	2	sides	½		5		10
D	4	legs	1¼		1¼		25
E	4	stretchers	⅝ diam.				16
F	4	stretchers	⅝ diam.				13
G	2	braces	½		1		19
H	1	strip	½		1		14½
J	1	panel	½		13½		12
K	1	support	½		4		13
L	1	support	¾		3		13
M	1	strip of leather					9

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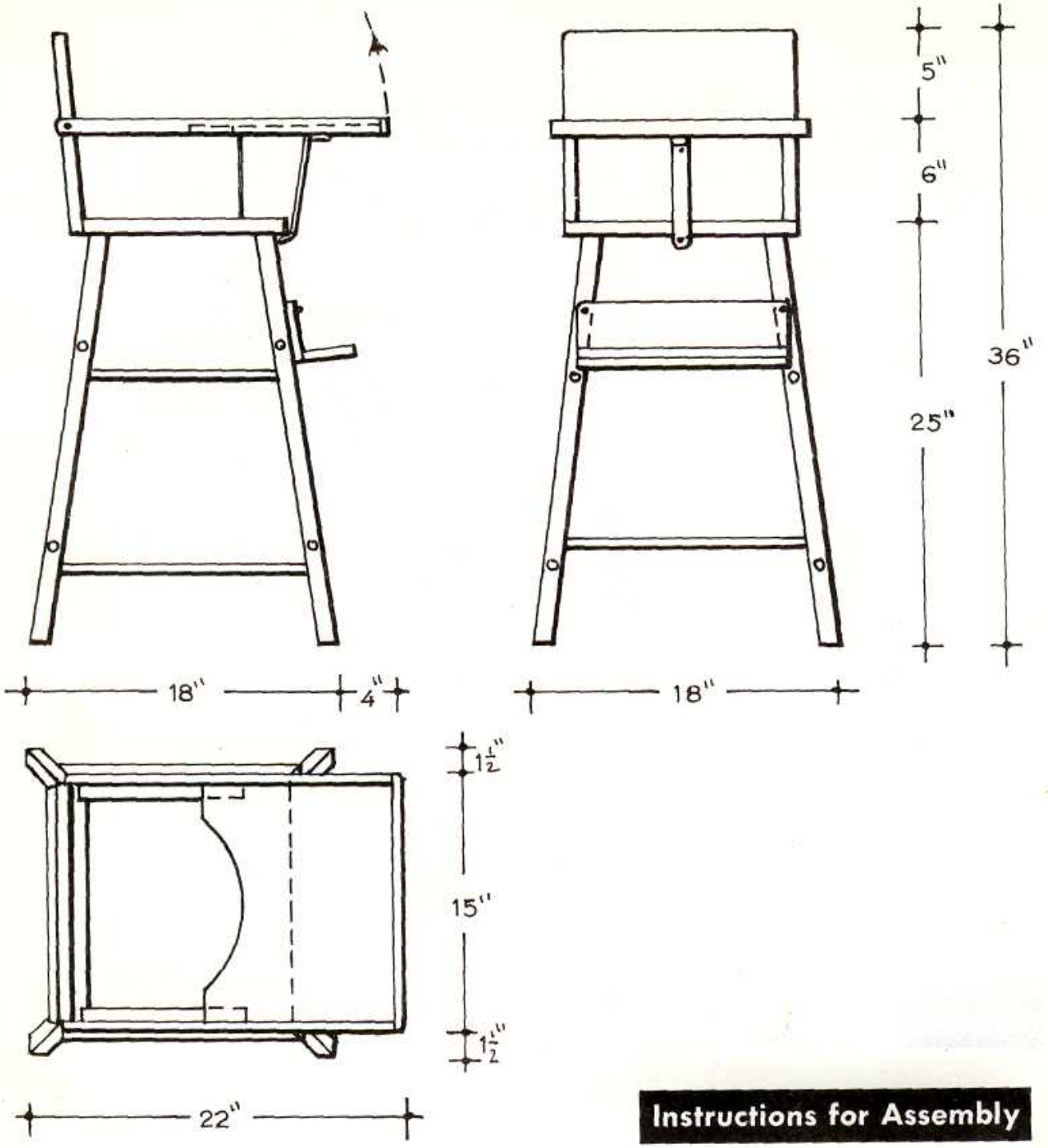

Instructions for Assembly

1. Attach back (A) to seat (B) and to sides (C).
2. Join legs (D) to stretchers (E) and (F).
3. Fasten legs (D) to seat (B).
4. Join strips (G) and (H) to panel (J) and fasten braces (G) to back (A).
5. Join supports (K) and (L) together and fasten to legs (D) with screws.
6. Fasten cleats (M) to (N).
7. Apply finish.

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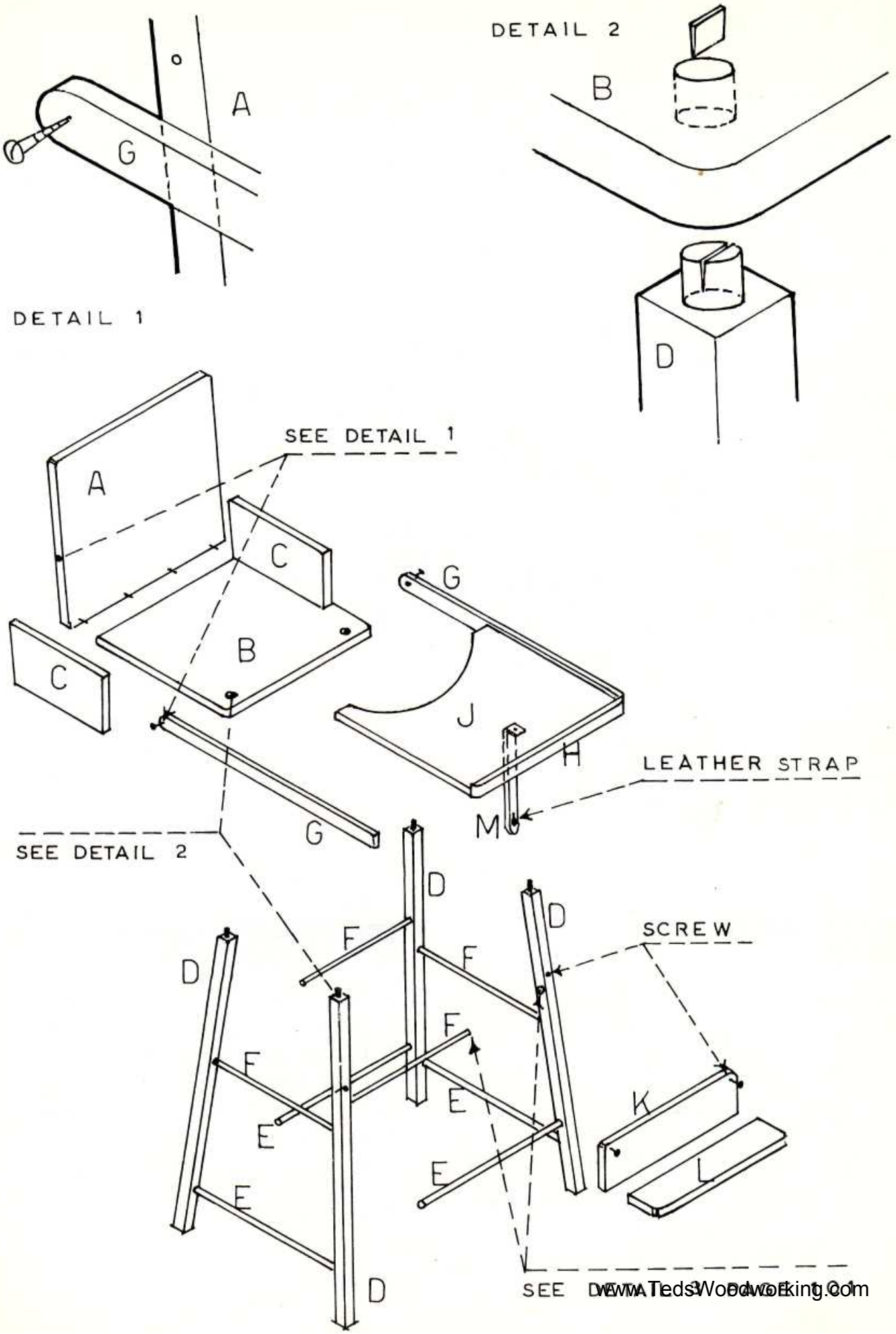

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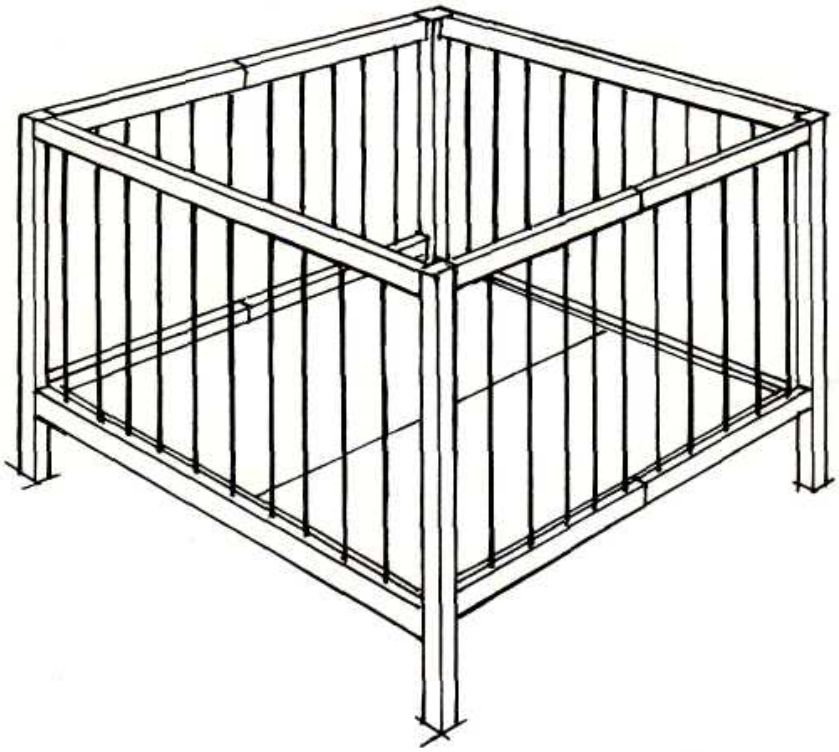
1.5 PLAY PEN

This model folds flat for ready portability or storage. Correct placement of the hinges is important for proper folding, as indicated in the plan view. A very useful item if it is not too confining for an active child.



List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length		
A	4	legs	1½	1½	32
B	4	rails	1	1½	37
C	8	rails	1	1½	18½
D	20	dowels	½ diam.		25
E	20	dowels	½ diam.		24
F	2	cleats	⅞	1¼	37
G	2	plywood panels	⅜	19	38
H	2	cleats	¾	2	36

Instructions for Assembly

1. Insert dowels (D) in rails (B) and join rails with legs (A).
2. Fasten cleats (F) to rails (B).
3. Insert dowels (E) in rails (C).
4. Join rails (C) together and with legs (A), using hinges.
5. Join panels (G) together with hinge and attach cleats (H).
6. Apply finish.

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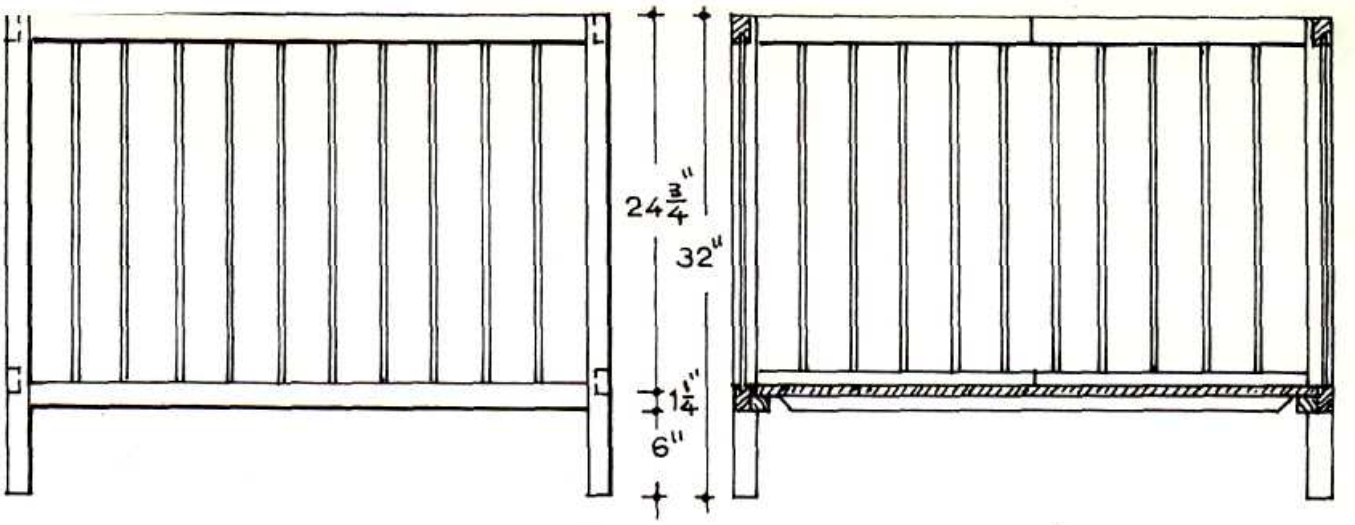
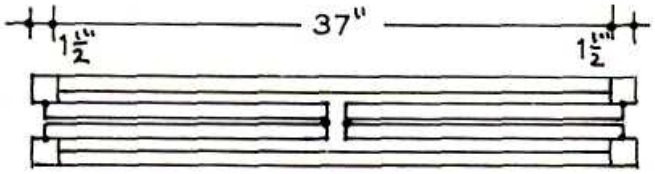
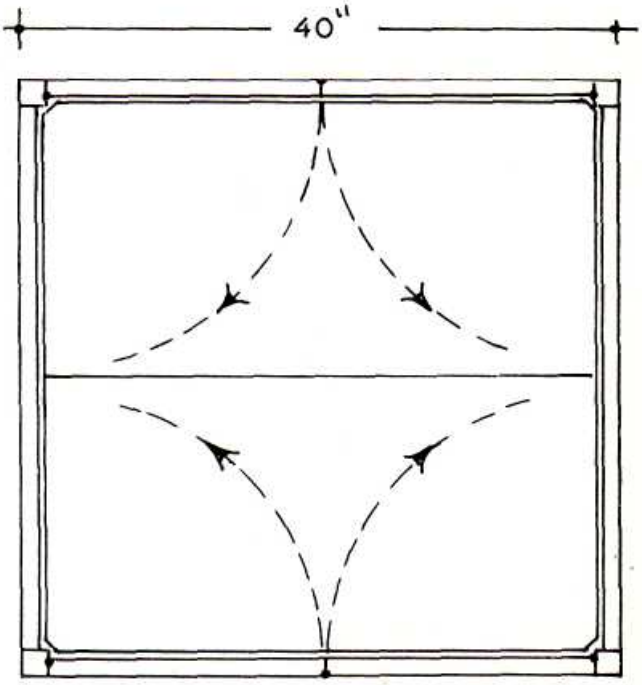
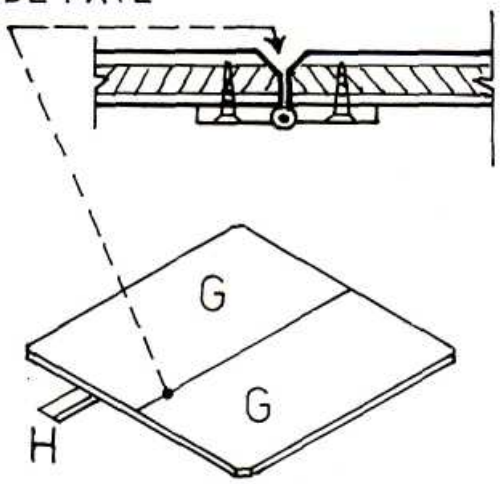
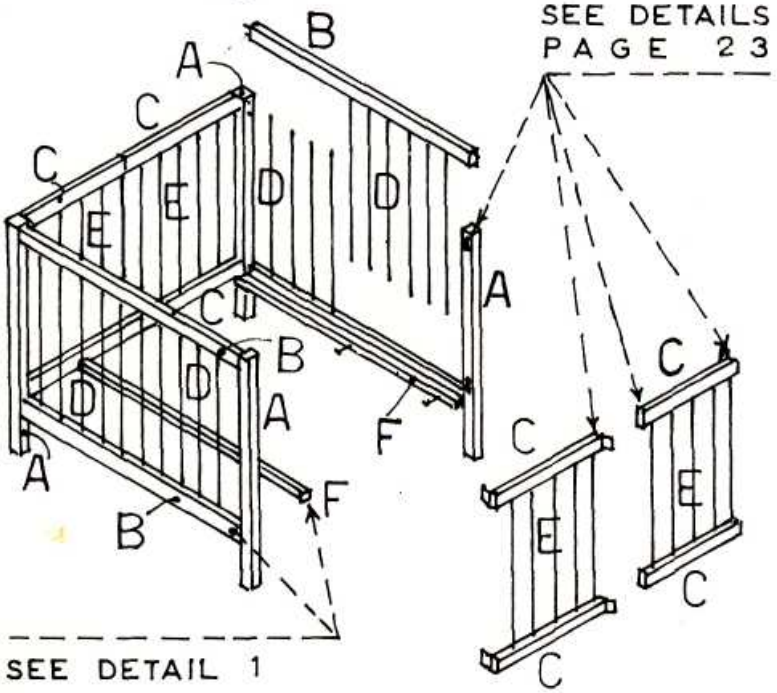






DETAIL

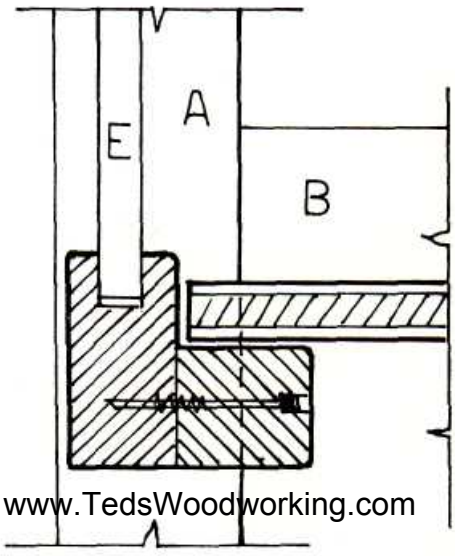




SEE DETAILS
PAGE 23

SEE DETAIL 1

DETAIL 1



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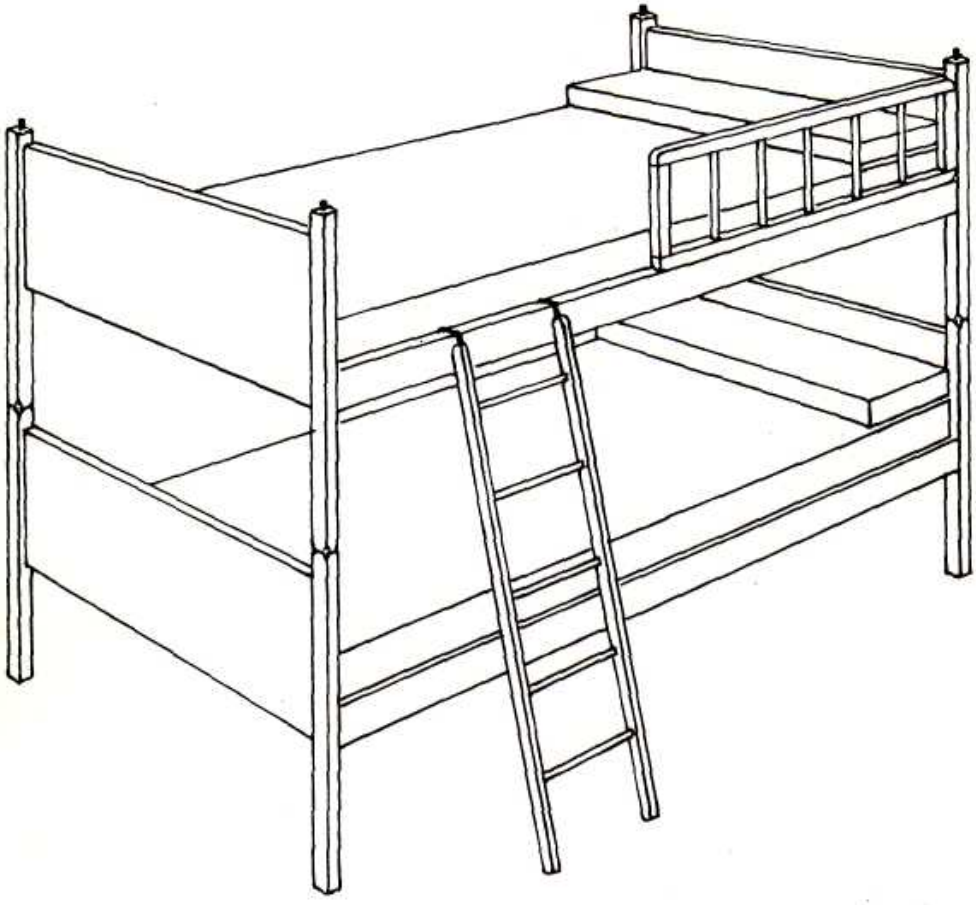
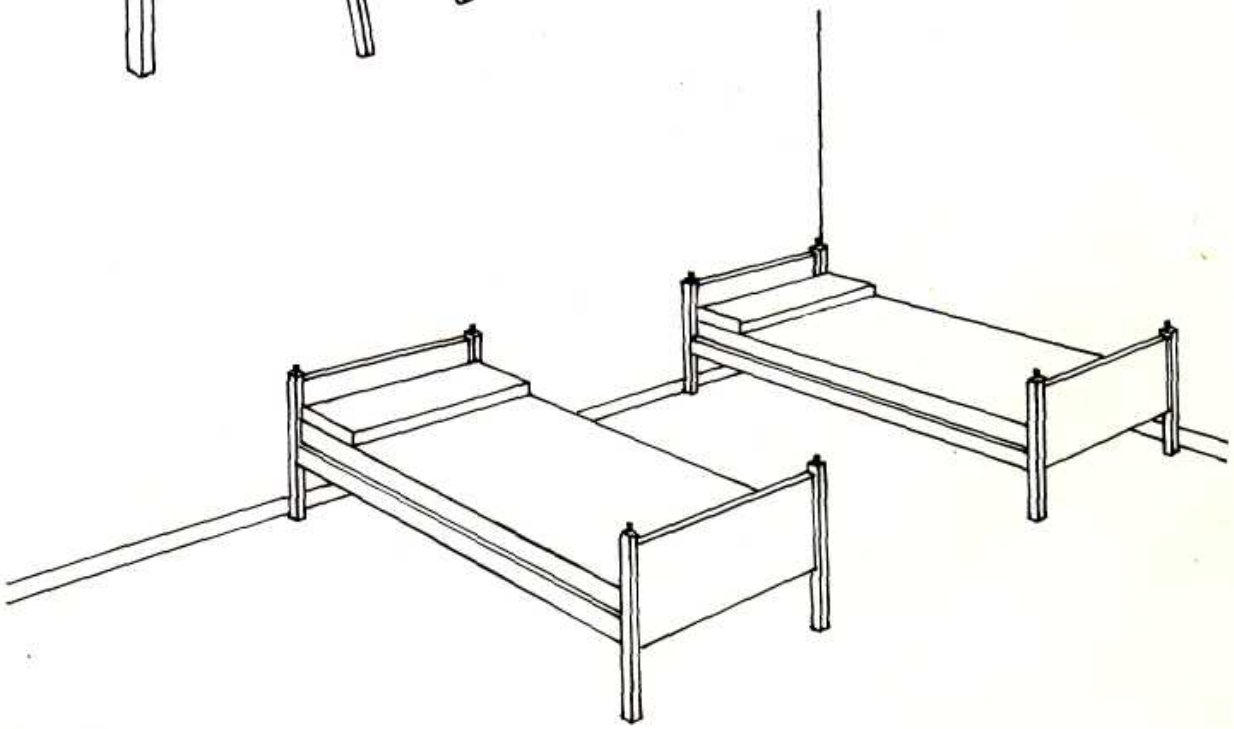
2.1 STACKING BEDS

Also called "double-decker" beds or bunks, these can be stacked when the bedroom is small, or used as separate beds when the room is large. The projecting dowels in the bedposts should be rounded so that they can be exposed with safety. The guard rail should be placed at the head of the top bed, permitting a sense of adventure without undue danger.





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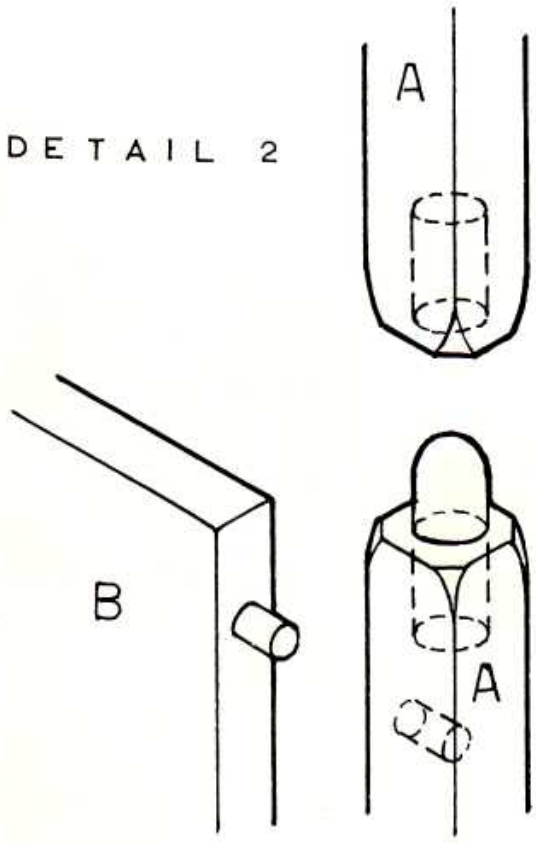
List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness	×	width	×	length
A	4	legs	1¾		1¾		32
B	2	panels	¾		18		34½
C	2	side rails	1		5		75
D	2	cleats	1¼		1¼		75
E	2	cleats	1¼		1¼		34½
F	1	plywood panel	½		35½		76½
G	2	rails	¾		1¼		13
H	2	rails	¾		1¼		36
J	5	dowels	⅜ diam.				12
K	5	dowels	¾ diam.				12
L	2	ladder supports	1		1¼		51
M	2	metal catch for ladder					
O	2	rails	¾		2		36½

(for ladder storage in bottom bed)



Instructions for Assembly

1. Join legs (A) with panel (B).
2. Attach cleats (D) and (E) to rail (C) and panel (B).
3. Insert side (C) in leg (A) and add rail (O) on bottom bed.
4. Insert dowels (J) in rail (H) and attach rails (G).
5. Join dowels (K) to ladder supports (L) and attach metal catch (M).
6. Apply finish.
7. Insert panel (F) and mattress.
8. Place top bed over lower bed and see that dowels on bedposts fit properly.

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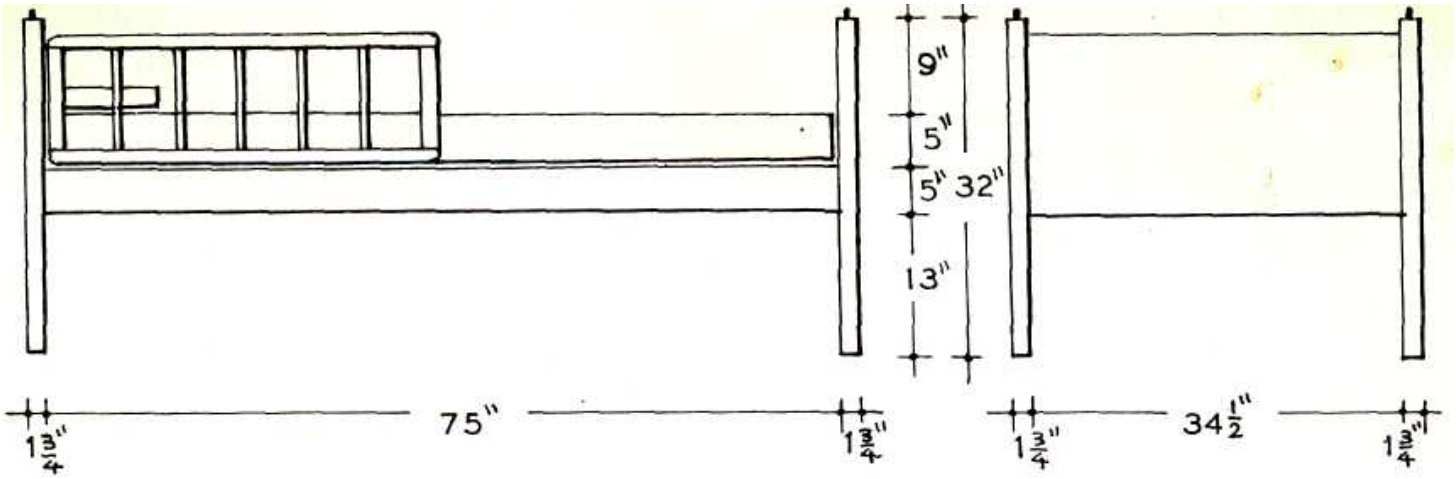
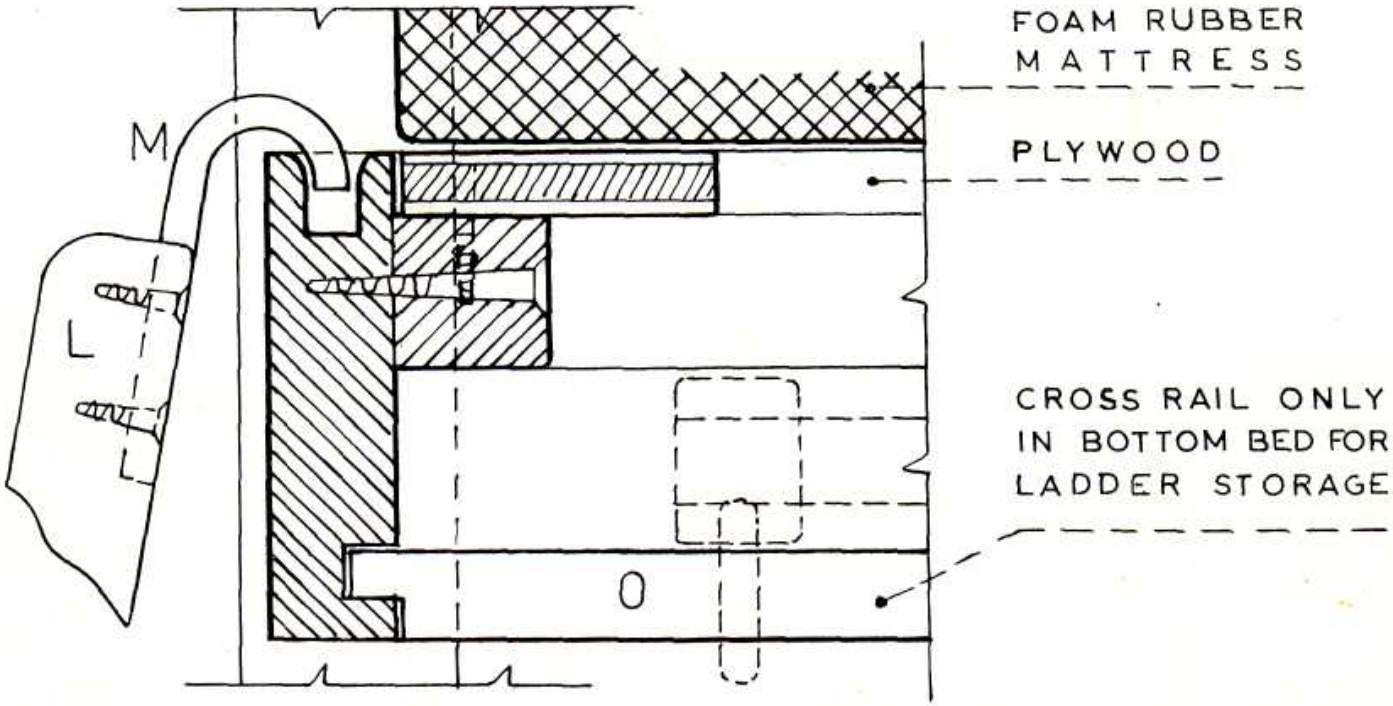
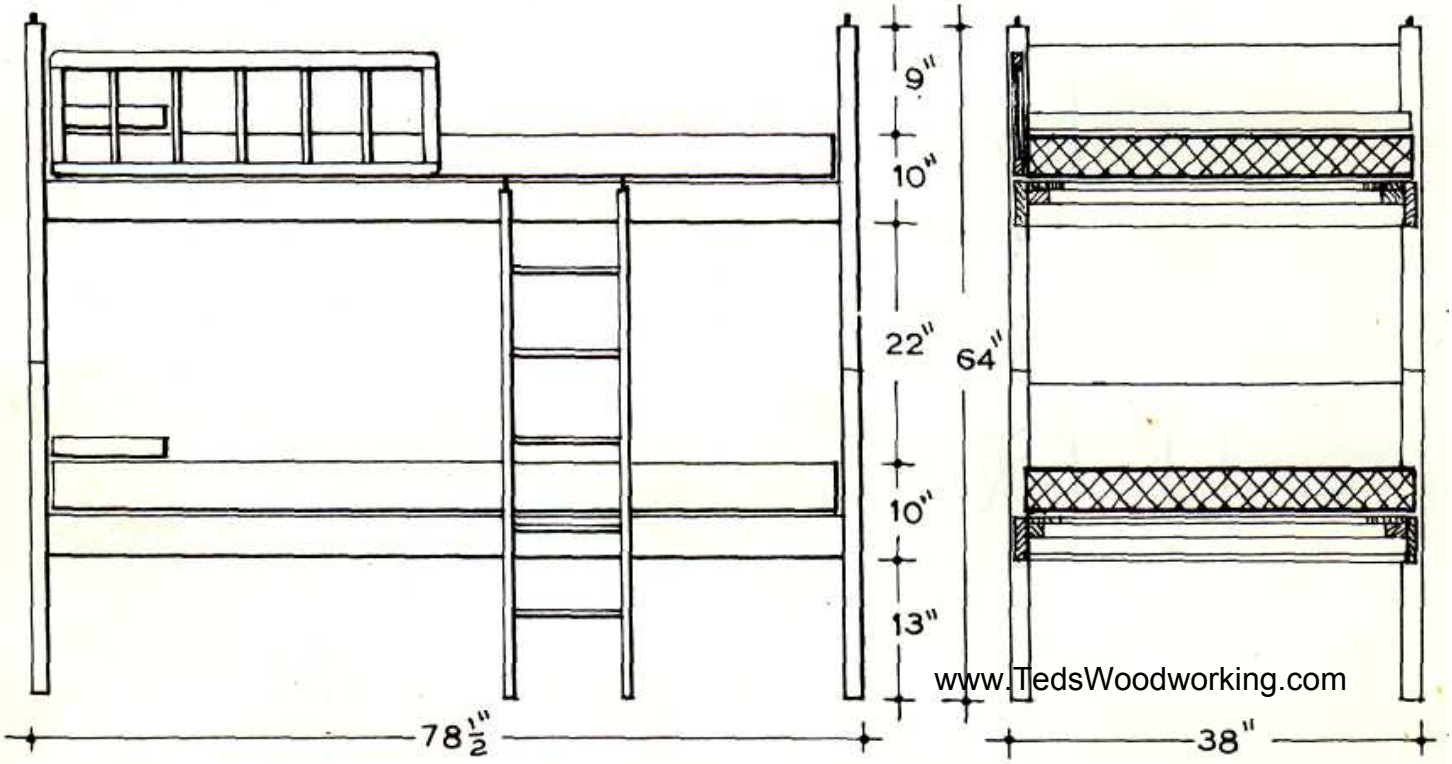


DETAIL 5





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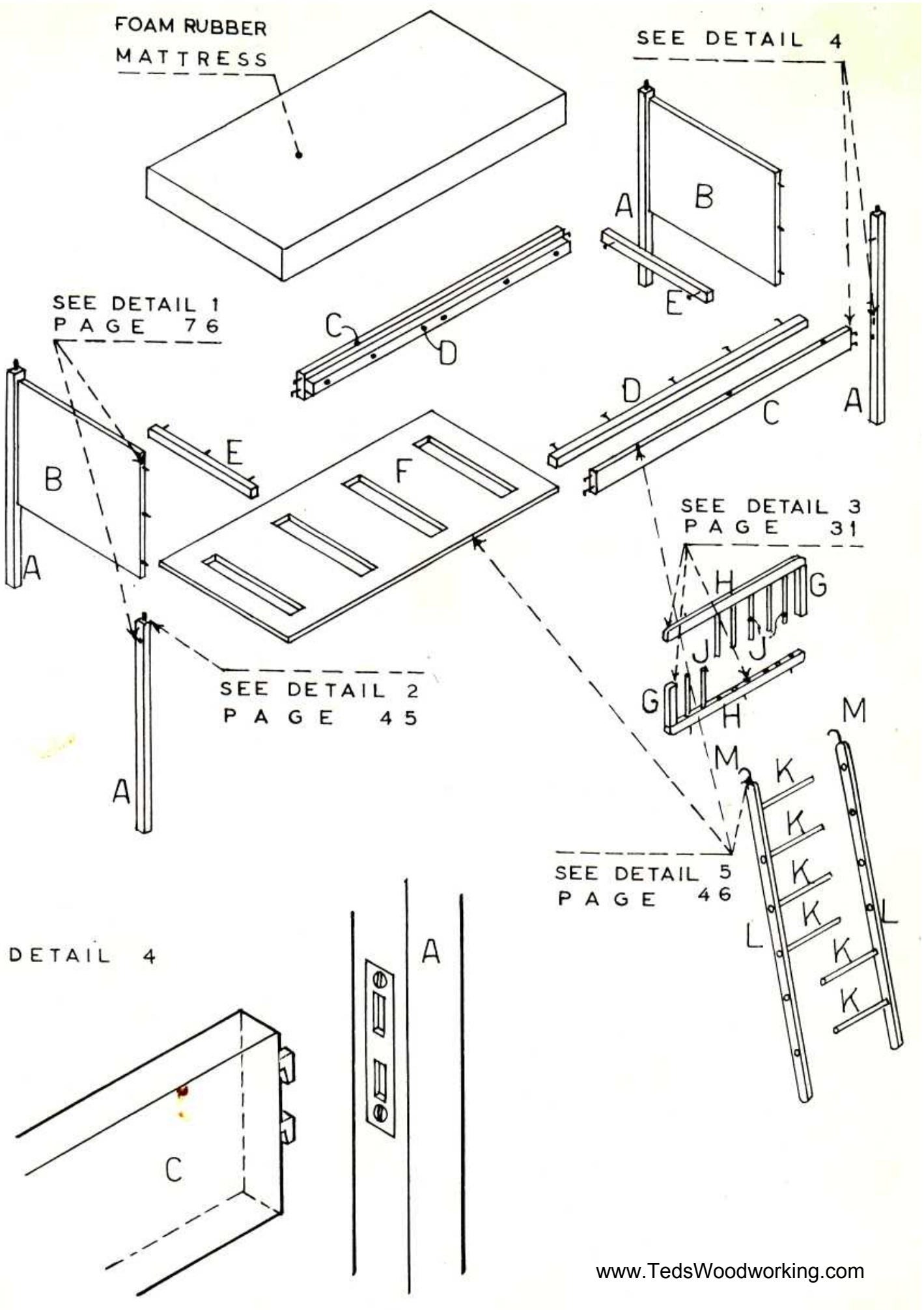

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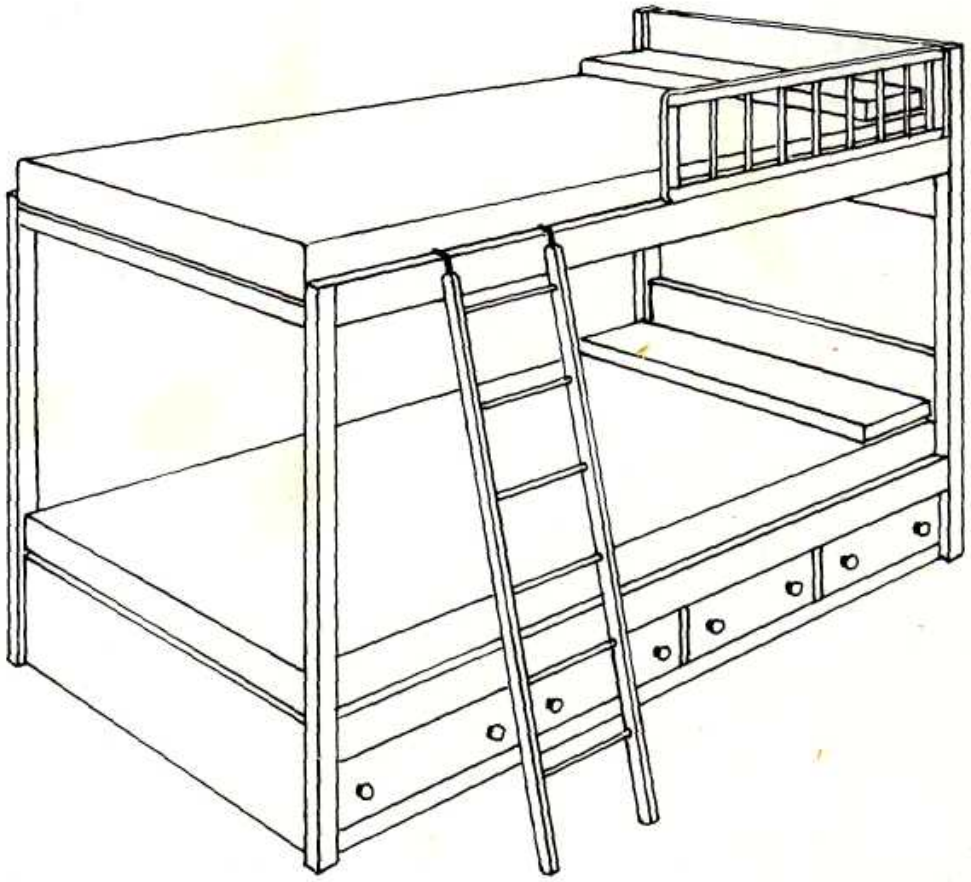
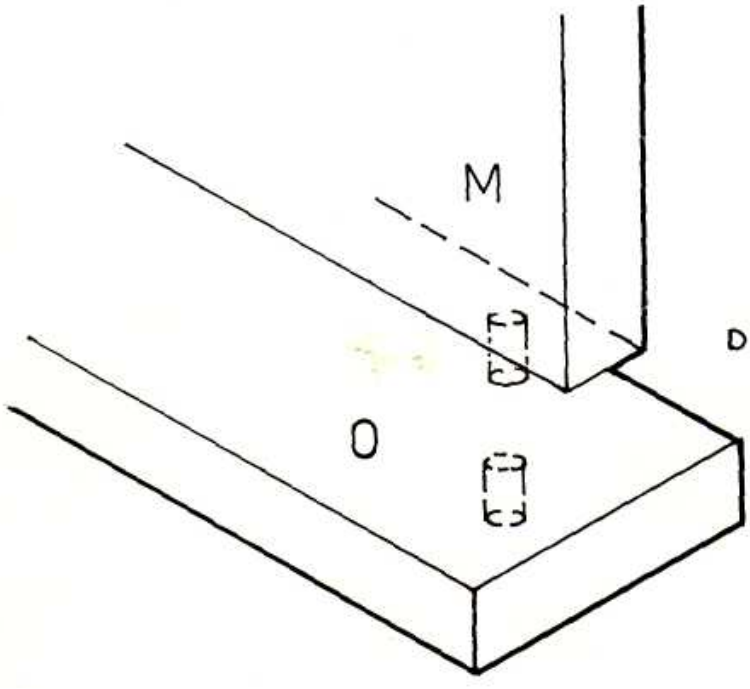
2.2 BUILT-IN DOUBLE DECKER with storage units

No dust under the beds with this neat, space-saving arrangement, and the four drawers provide ample stowage for toys, spare blankets or pajamas. This project requires some degree of craftsmanship and patience, but will provide enormous satisfaction for the whole family. As in Project 2.1, the guard rail should be at the pillow end of the top bed.





DETAIL 1

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List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness	×	width	×	length
A	2	supports	1½		2½		64
B	2	supports	1½		2½		54
C	4	rails	1½		4		73
D	1	headboard	¾		17		36
E	1	headboard	¾		24		36
F	1	rail	1½		2½		36
G	1	panel	¾		13		36
H	4	cleats	1¼		1½		75
J	3	cleats	1¼		1½		33½
K	1	back	¾		9		73
L	1	plywood panel	⅜		36		73
M	3	partitions	1		8		37
O	5	drawer slides	¾		3		36½
P	1	toeplate	1		2		73
Q	2	rails	¾		1¼		36
R	2	rails	¾		1¼		9½
S	7	dowels	⅜ diam.				8½
T	2	rails	1		1½		55
U	6	dowels	⅞ diam.				12
V	4	drawer fronts	¾		7		17½
W	8	drawer sides	½		7		36¾
X	4	drawer backs	½		6½		16½
Y	4	drawer bottoms	¼		17		36½
Z	50 ft	rubber straps	2″ wide				

Instructions for Assembly

1. Join supports (A) with headboards (D) and (E) and supports (B) with rail (F) and panel (G).
2. Fasten supports (A) and (B) with rails (C), back (K) and toeplate (P).
3. Attach partition (M) to drawer slides (O) and fasten to rails (C), back (K) and toeplate (P).
4. Attach cleats (H) to rail (C) and cleats (J) to headboards (D) and (E) and to panel (G).
5. Install plywood panel (L) and rubber strap (Z) as shown in detail drawing.
6. Insert dowels (S) in rails (Q) and attach rails (R).
7. Join sides of drawers (W) to front (V) and back (X); install bottoms (Y).
8. Join dowels (U) with ladder supports (T).
9. Apply finish.

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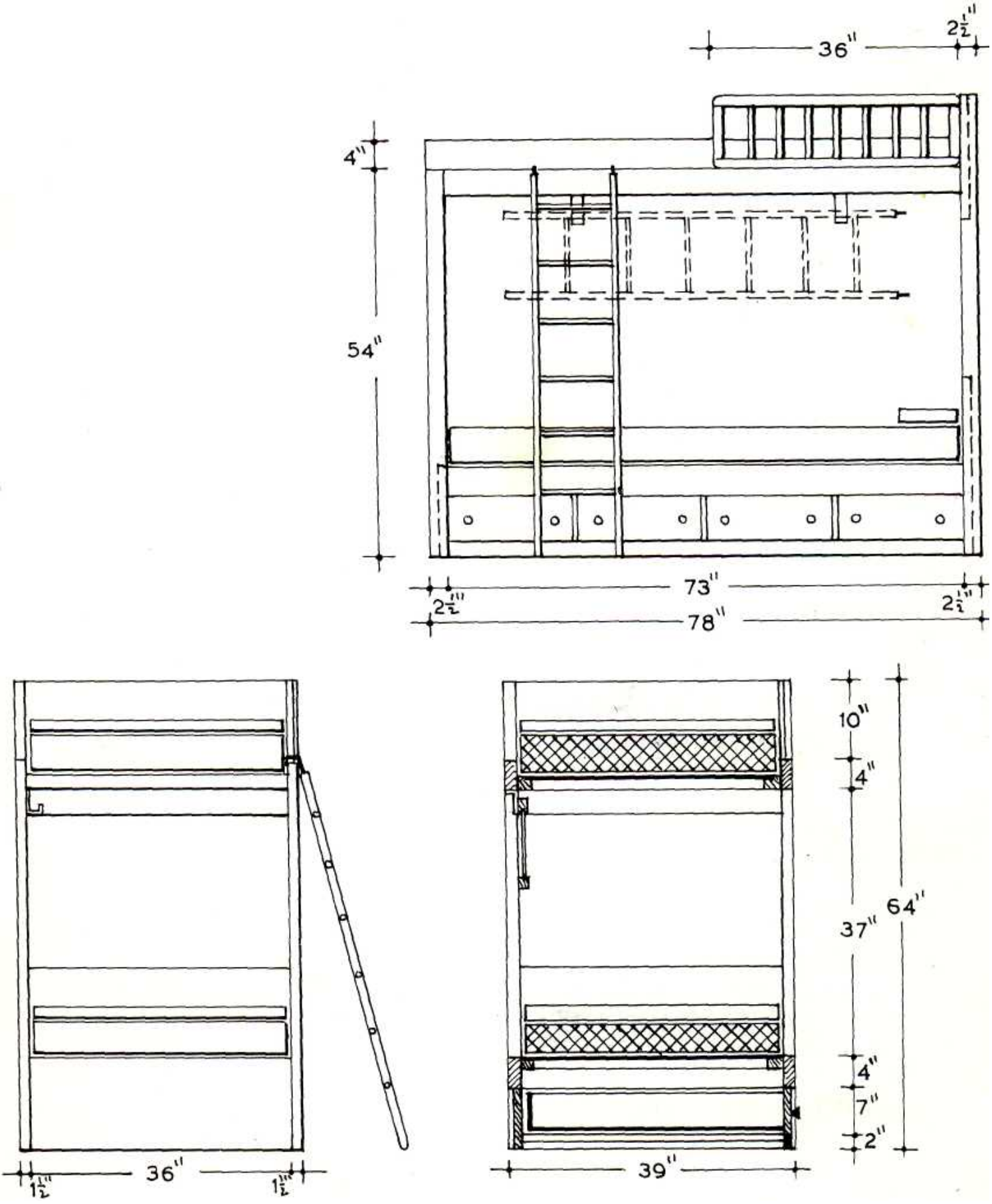

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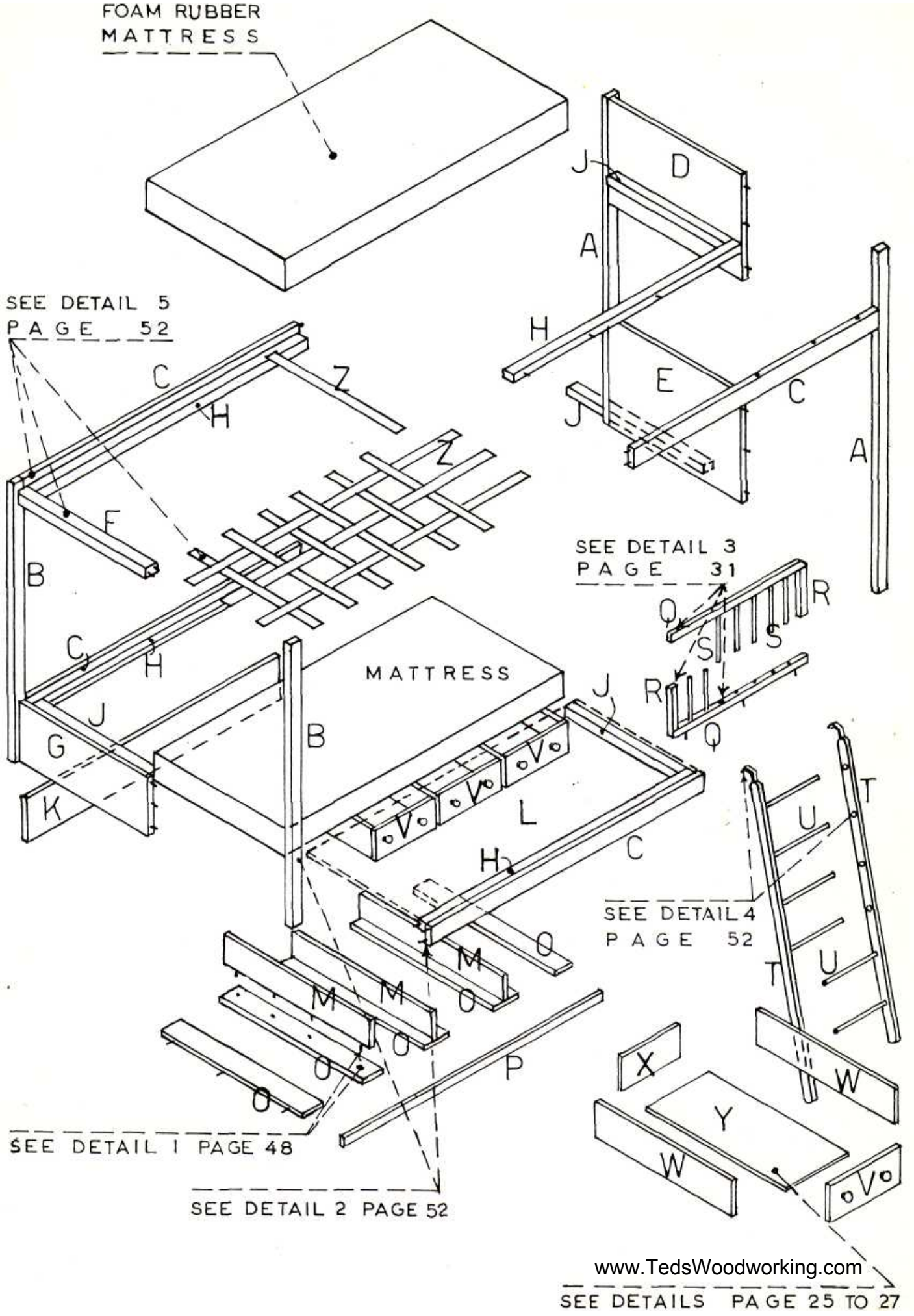

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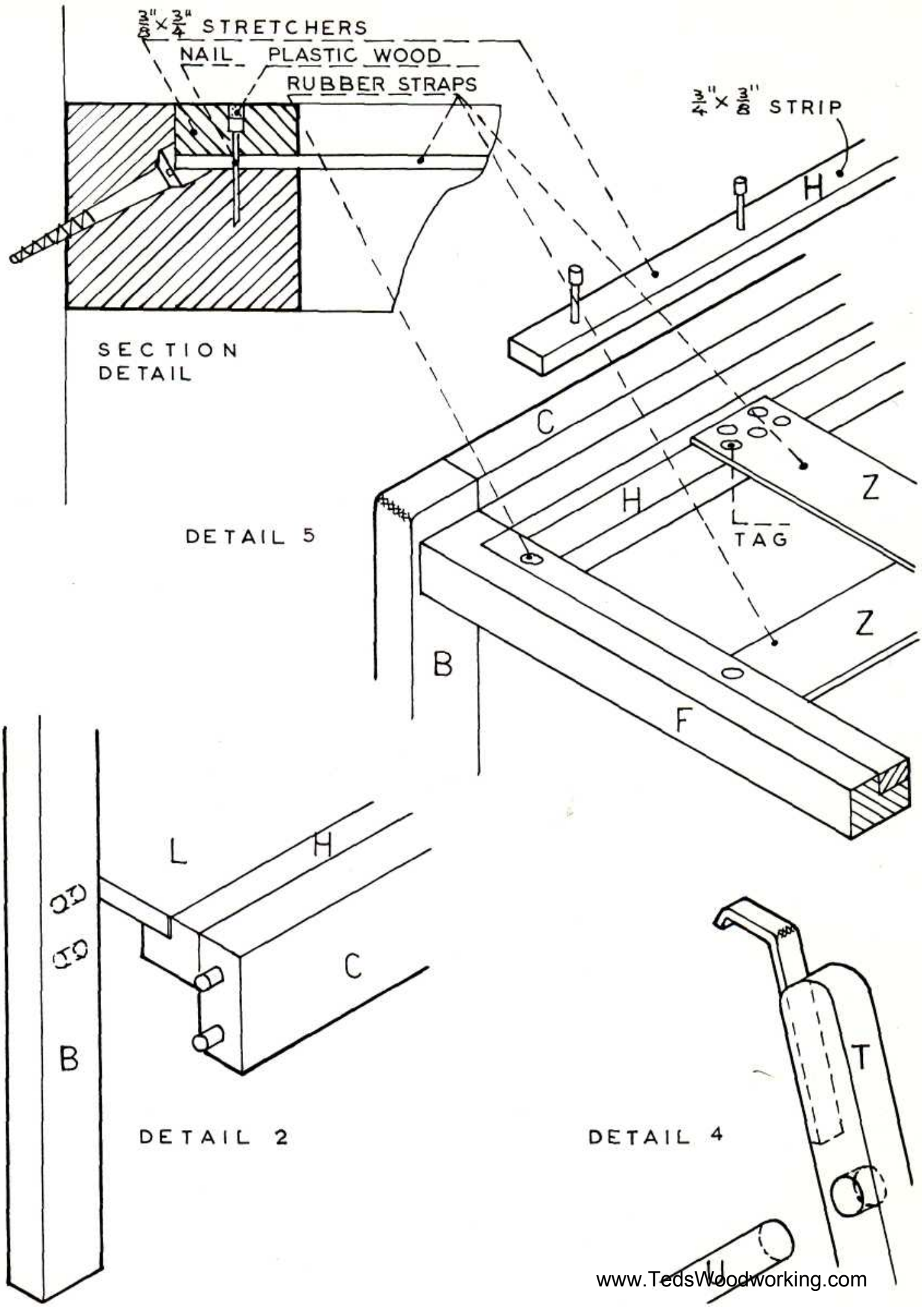

DETAIL 5

DETAIL 2

DETAIL 4

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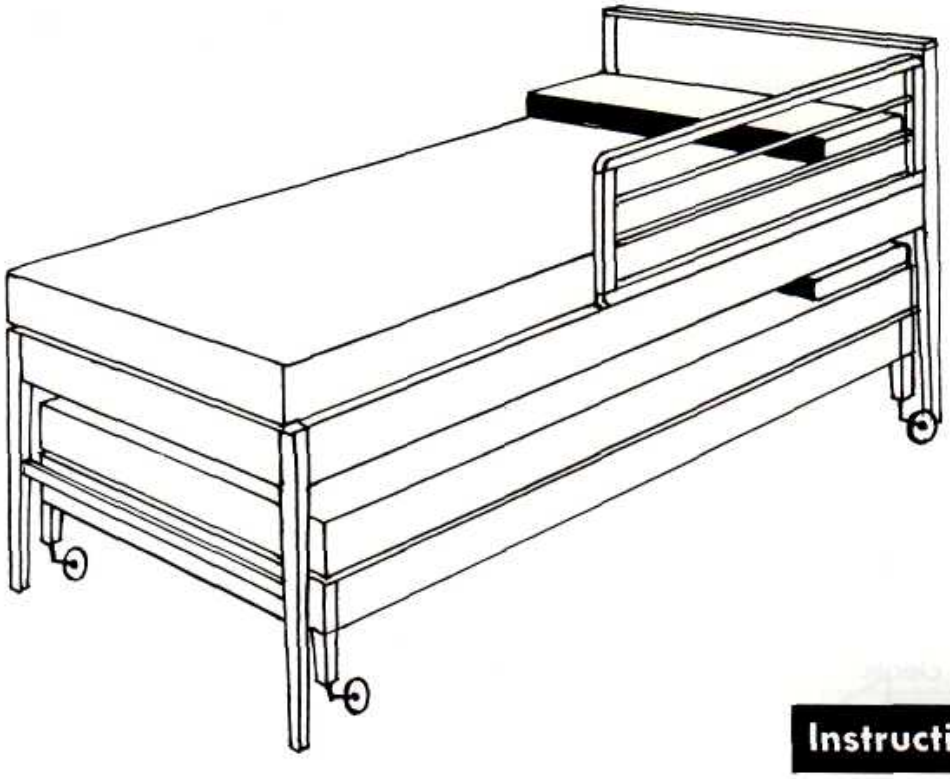
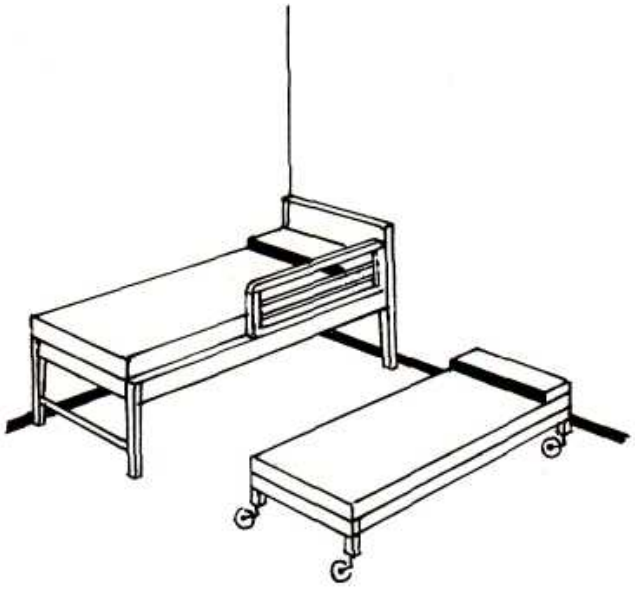
2.3 TRUNDLE BED

A modern version of the classic bedroom space-saver. The legs of the main or upper bed can be made shorter if desired, provided the trundle bed is not made up with pillow. This is a highly practical solution when the bedroom is small and play space is scarce.





Instructions for Assembly

1. Join legs (A) with rails (E) and (F), and legs (B) with headboard (C).
2. Fasten side rails (G) to legs (A) and (B).
3. Attach strip (D) and cleats (H, J) to headboard (C) and rails (E) and (G).
4. Proceed in same manner for lower bed.
5. Fasten rubber straps to cleats (H, J and R) with tags and cover the straps with strips (K, L and S) as indicated in detail drawing.
6. Insert stretchers (N) in rails (O) and attach rails (M).
7. Apply finish and insert casters in trundle bed.

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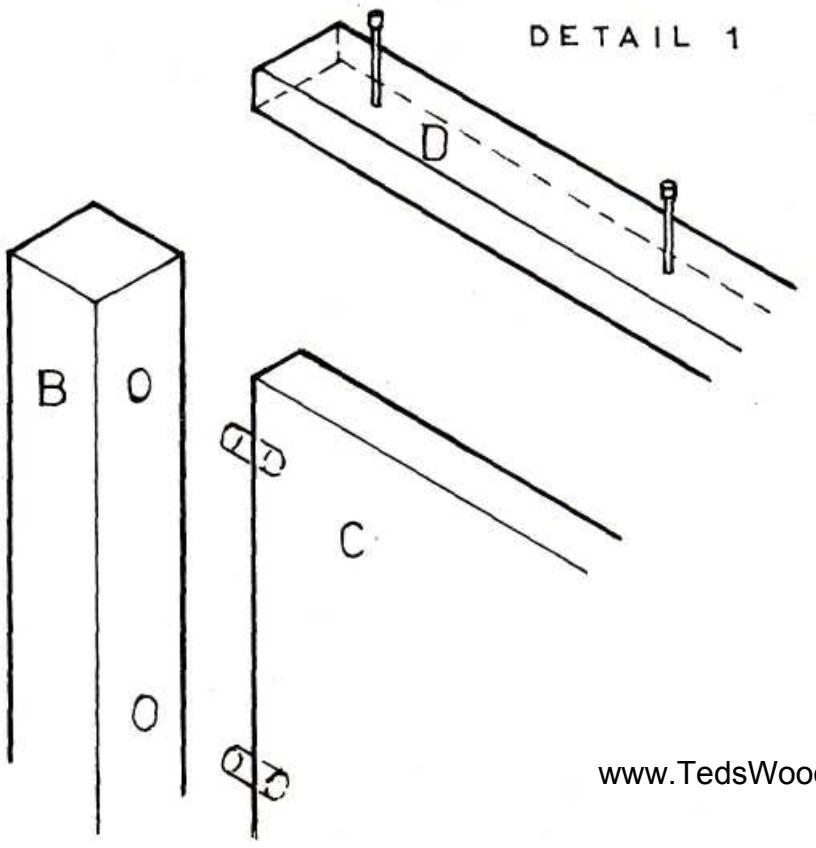
List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness	×	width	×	length
A	2	legs	1½		1½		23
B	2	legs	1½		1½		36
C	1	headboard	¾		16½		36
D	1	strip	½		1½		39
E	3	rails	1		4		36
F	2	rails	¾		1¼		38
G	2	side rails	1		4		74
H	4	cleats	¾		¾		37
J	2	cleats	¾		¾		75
K	2	strips	⅜		¾		75
L	4	strips	⅜		¾		37
M	2	rails	¾		1¼		36
N	2	stretchers	⅜		1		35
O	2	rails	¾		1¼		12½
P	4	legs	1½		1½		10
Q	2	side rails	1		4		70
R	2	cleats	¾		¾		71
S	2	strips	⅜		¾		71
T	100 ft	rubber straps	2″ wide				



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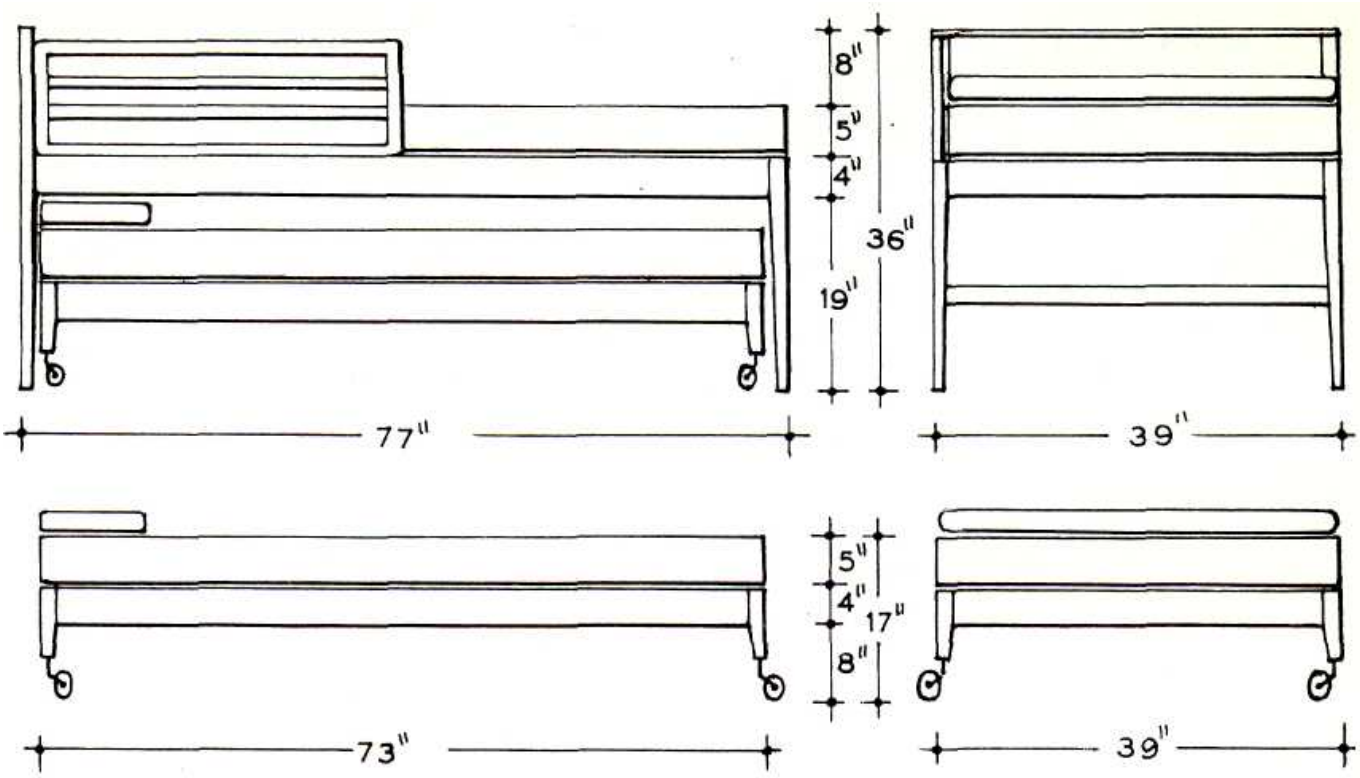
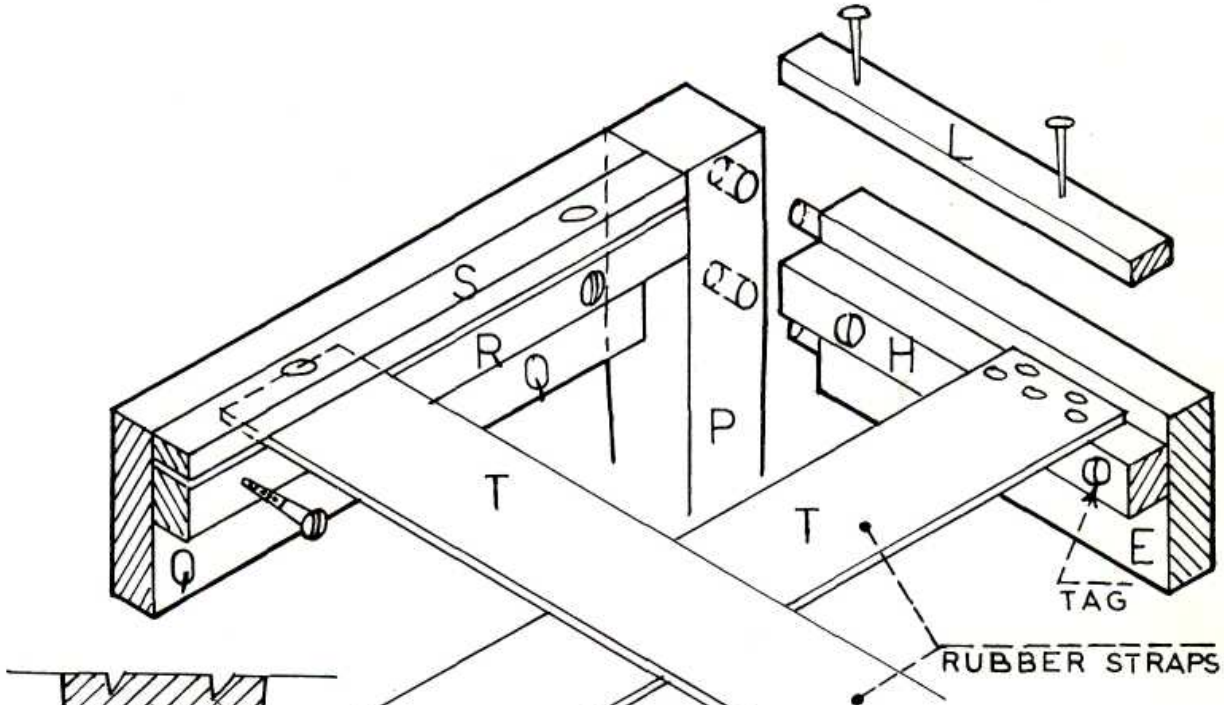
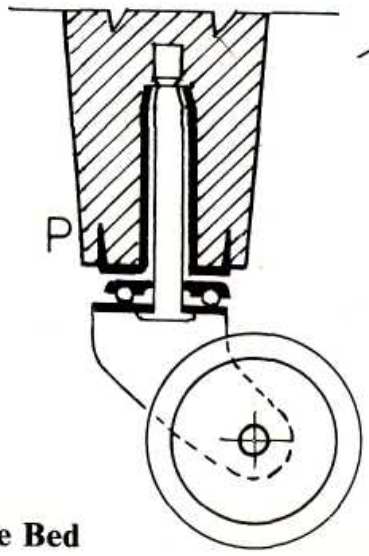




DETAIL 4



DETAIL 3

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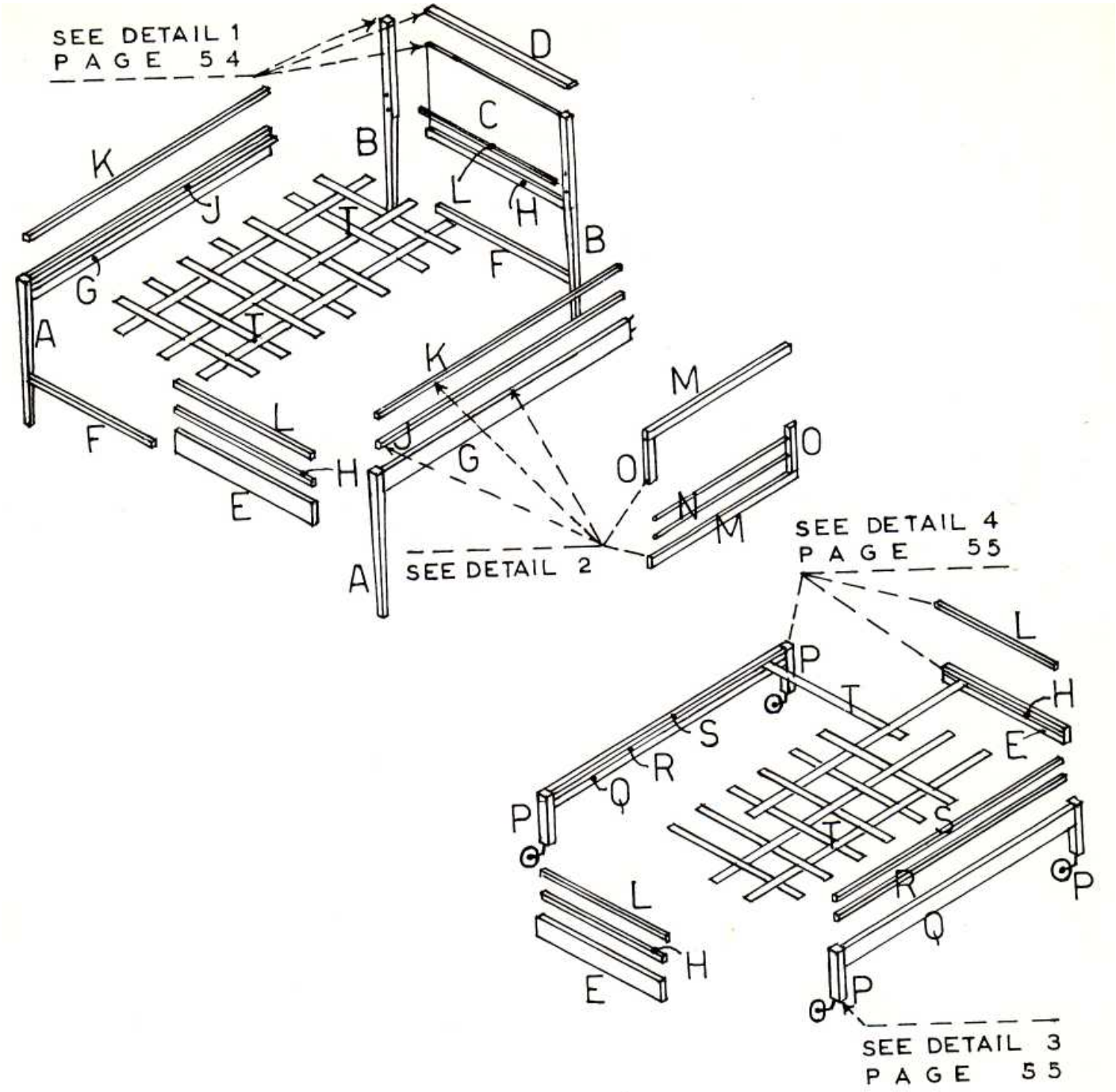

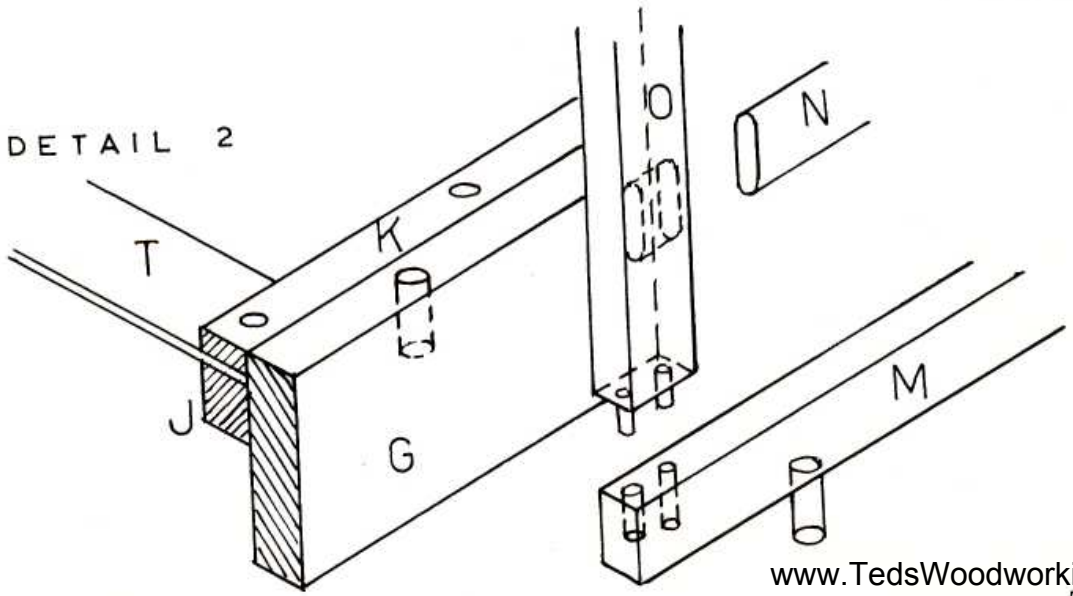

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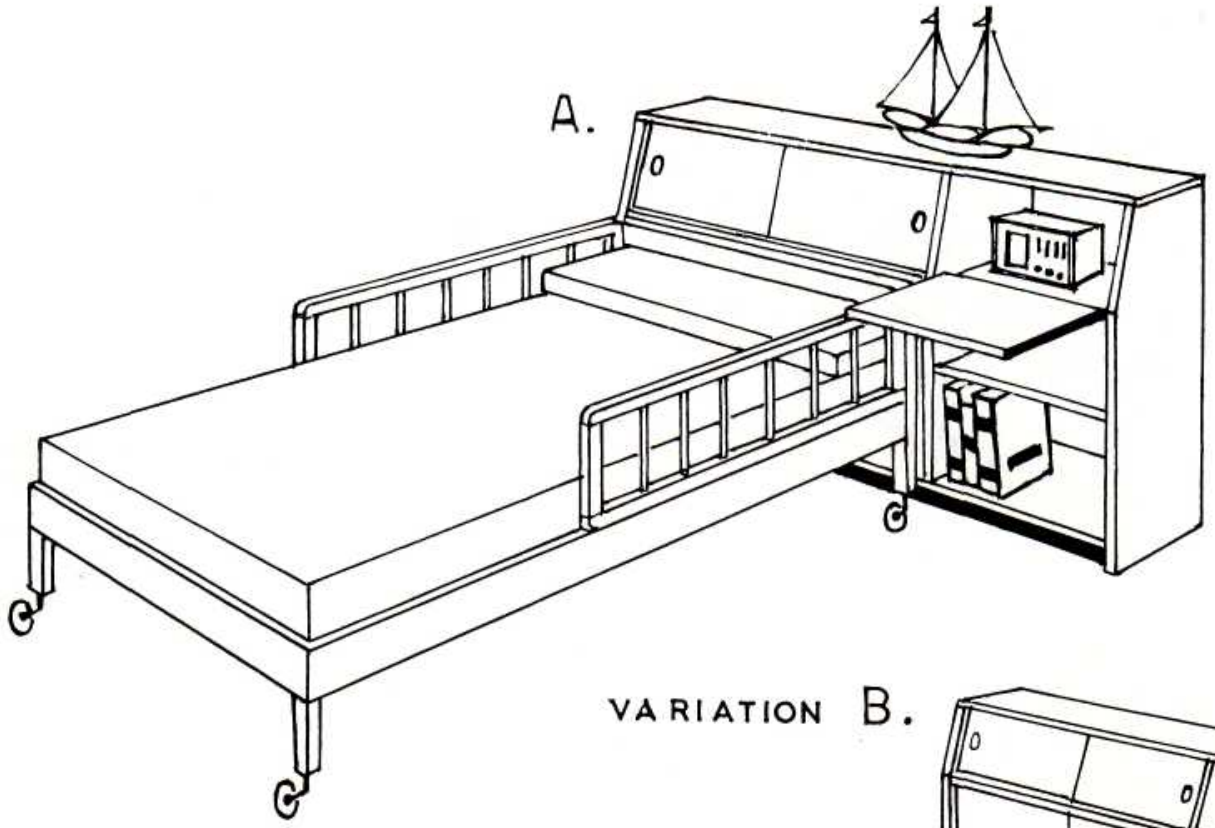
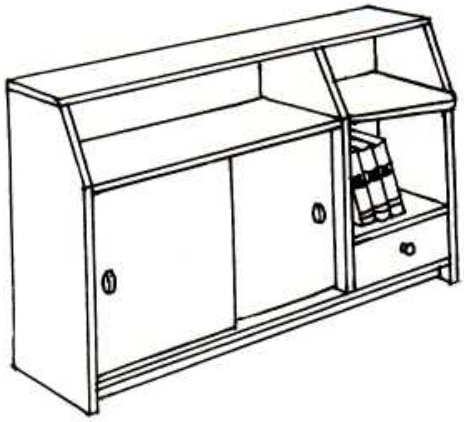
2.4 JUNIOR BED WITH HEADBOARD

An interesting and practical piece that provides desk and storage space without being cumbersome. The bed matches any one of the four designs of headboard. In variations A and B the angle of the sliding doors permits a shut-in to be supported by pillows while reading or drawing.



VARIATION B.



VARIATION C.

VARIATION D.

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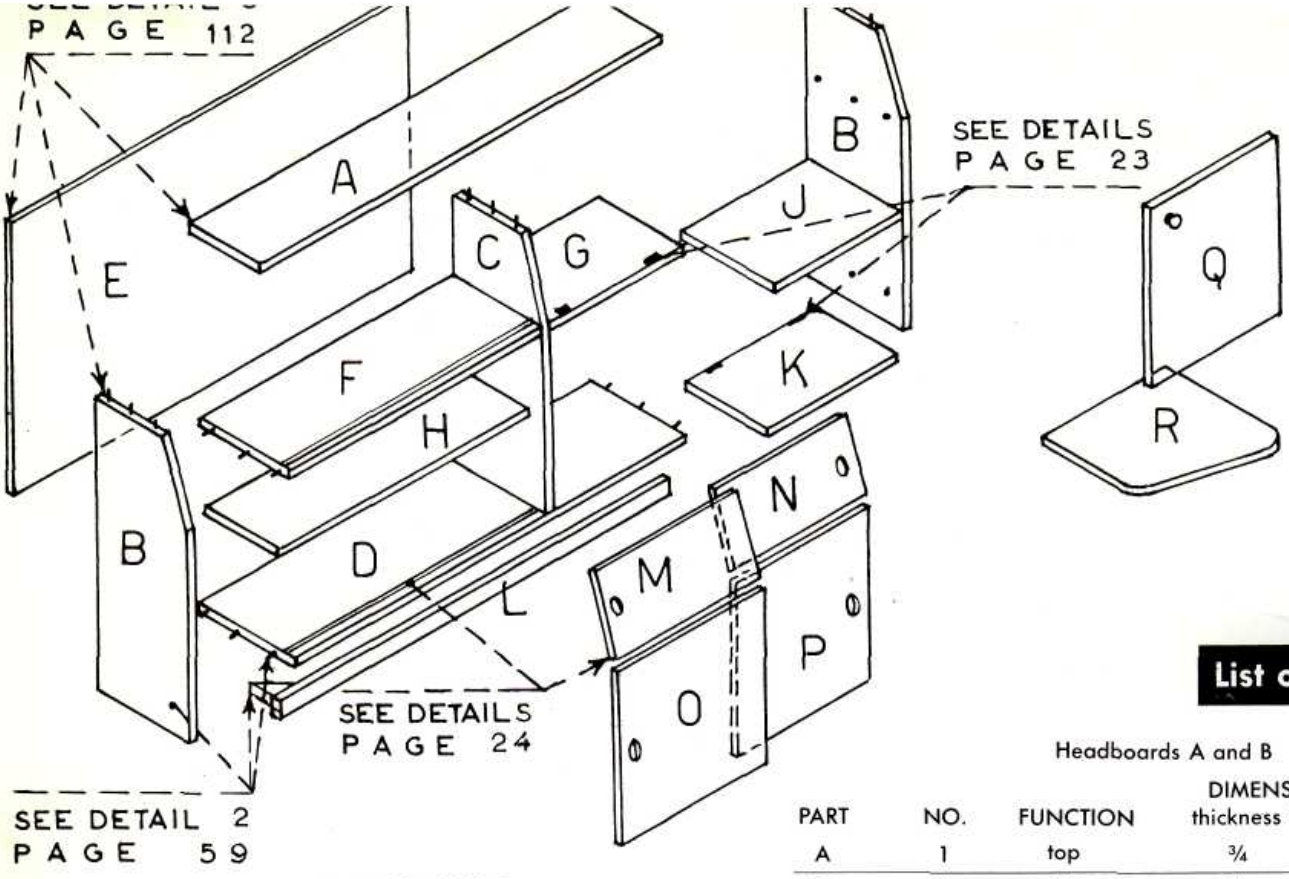

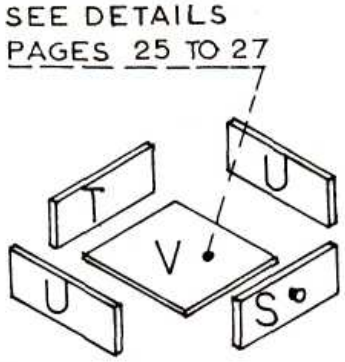

List of Materials

Headboards A and B

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length		
A	1	top	¾	8¼	66
B	2	sides	¾	12	38¼
C	1	partition	¾	11¾	34½
D	1	bottom	¾	12	64½
E	1	back	¼	35½	65½
F	1	shelf	¾	11¾	40½
G	1	shelf	¾	11¾	23¼
H	1	shelf	¾	10	40½
J	1	shelf	½	11¾	23¼
K	1	door	¾	13	23¼
L	1	toeplate	¾	3	64½
M	1	door	¼	13¼	20¼
N	1	door	¼	13¼	21¼
O	1	door	¼	22¼	20¼
P	1	door	¼	22¼	21¼
		Variation for Headboard B			
Q	1	door	¾	23¼	21¾
		Also reduce shelf (J) above to 10 in. width.			
		Headboards C and D			
		Reduce length by 6 in.; eliminate all top doors. Shelves G and J are 17¼ in. in length.			
		Variation for Headboard C			
R	1	shelf	¾	17¼	18
S	1	drawer front	¾	6	17¼
T	1	drawer back	½	5½	16¼
U	2	drawer sides	½	6	11⅜
V	1	drawer bottom	¼	16¾	11¼

Instructions for Assembly

1. Join bottom (D) and shelves (F) and (G) with partition (C) and side (B).
2. Attach top (A) and back (E).
3. Fasten toeplate (L) and door (K).
4. Install shelves (H) and (J) and add doors (M, N, O and P).
5. Apply finish.
6. If variations are used, add door (Q); build drawer and join side (U) with front and backs (S) and (T), and install drawer bottom (V).

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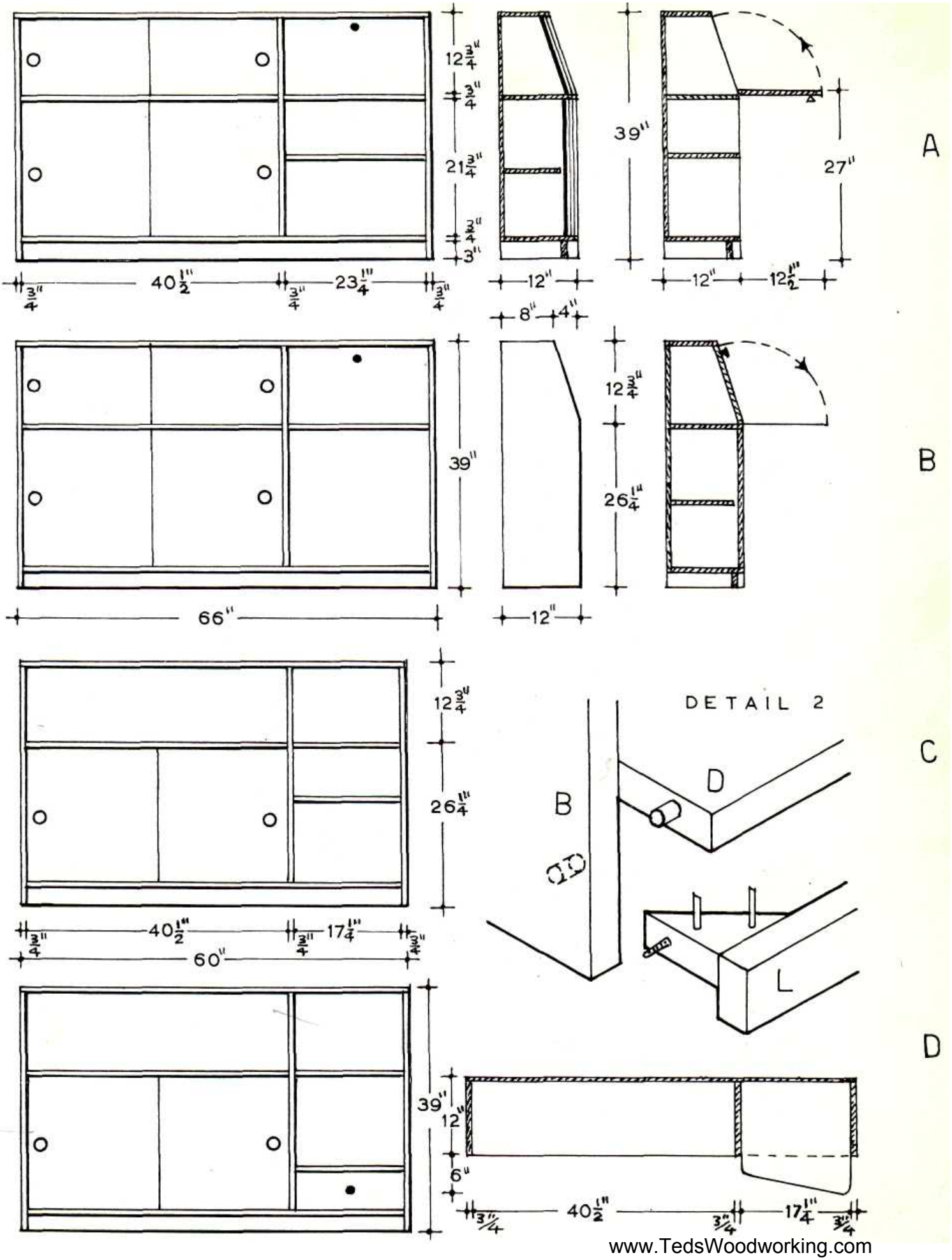

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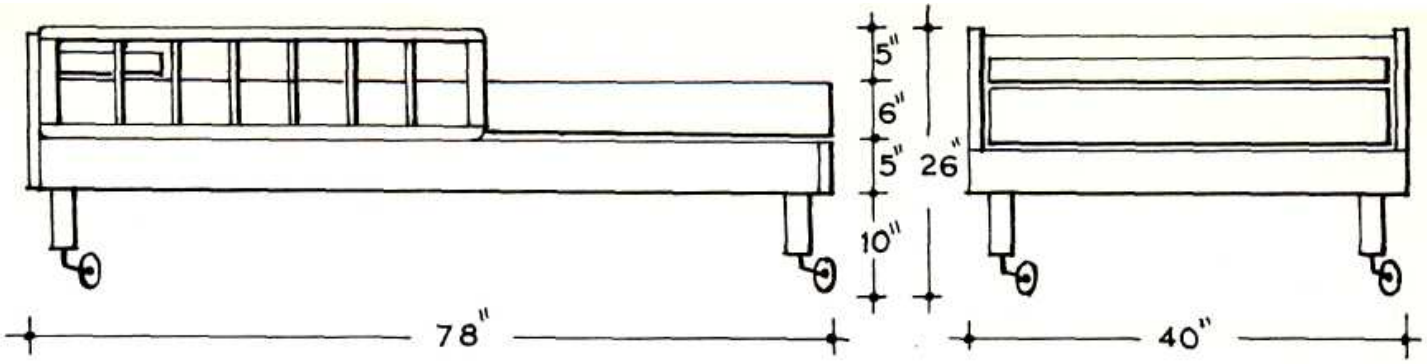
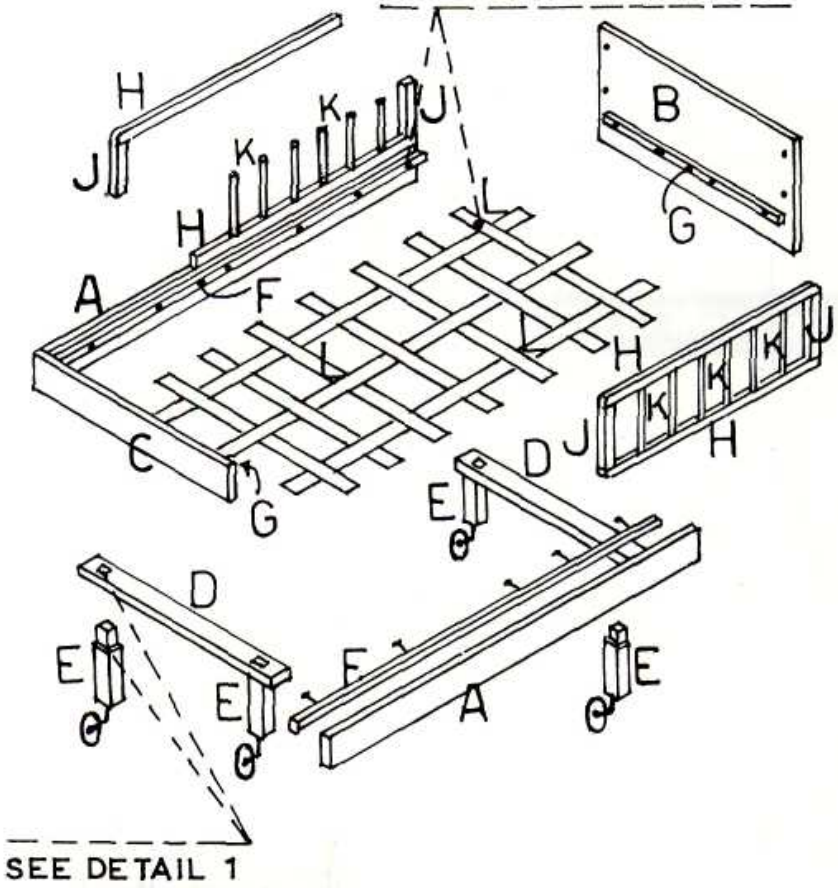


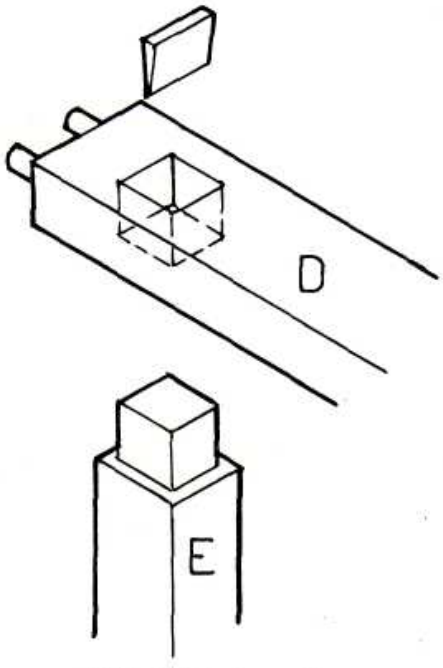
SEE DETAIL 4 PAGE 55

Instructions for Assembly

1. Join crossrails (D) with legs (E).
2. Fasten side rail (A) to rails (D) and (C) and headboard (B).
3. Attach strips (F) and (G) to rails (A) and (C) and headboard (B).
4. Insert dowels in rails (H) and attach rails (J).
5. Fasten rubber strip (L) to strips (F) and (G).
6. Apply finish.
7. Insert casters, install mattress and side protection.



SEE DETAIL 1



DETAIL 1

List of Materials

BED

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length		
A	2	side rails	1	5	76
B	1	board	¾	15	40
C	1	rail	1	5	40
D	2	rails	1	2	38
E	4	legs	1⅜	1⅜	8
F	2	strips	¾	1	76
G	2	strips	¾	1¼	36
H	4	rails	¾	1¼	42
J	4	rails	¾	1¼	11
K	12	dowels	⅜ diam.		10
L	50	rubber strips	2″ wide		

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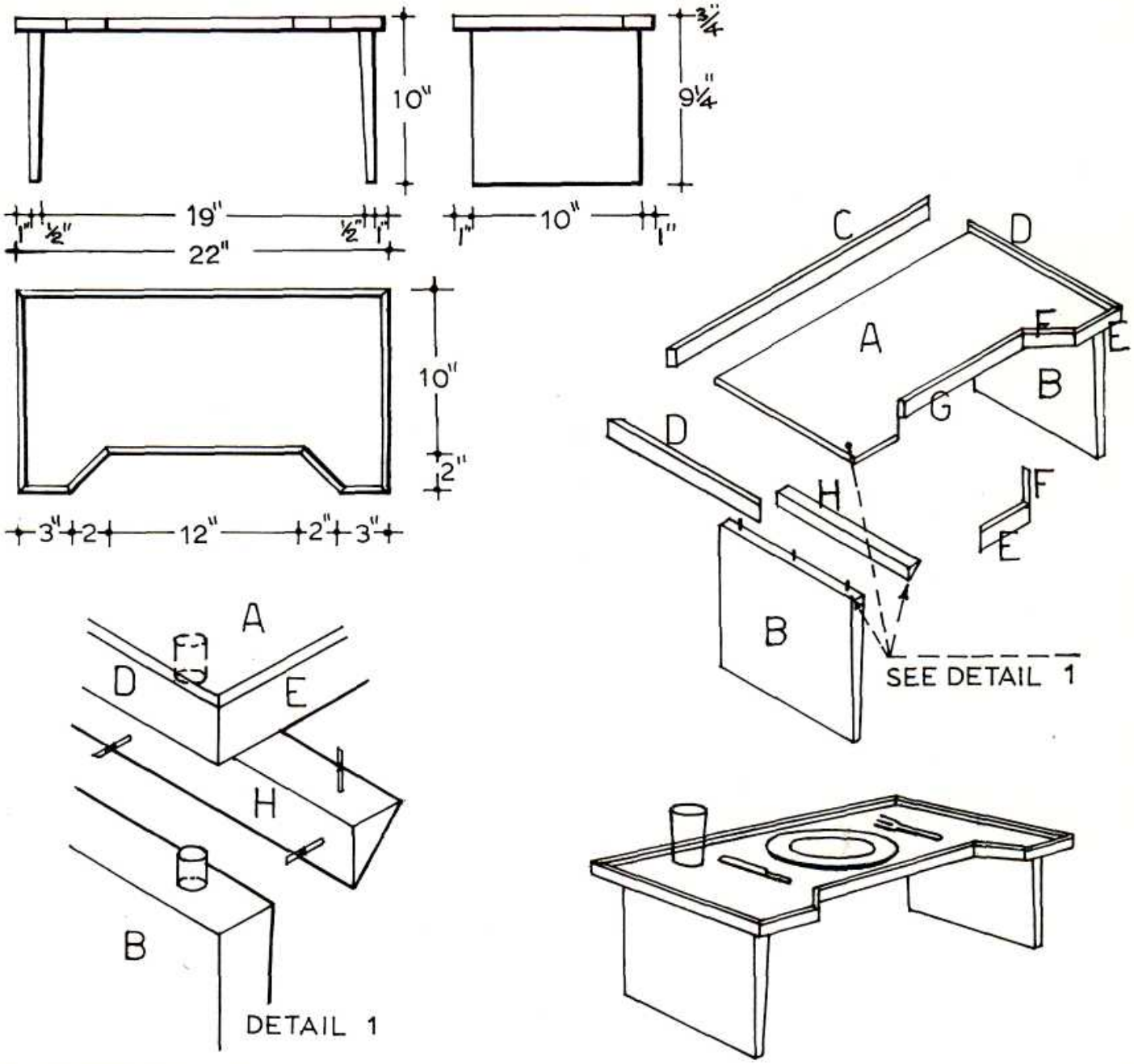
2.5 TRAY

This is more than just an ordinary tray; it can be placed on the floor, thus eliminating the need for a table, and it is particularly adaptable for outdoor use.



List of Materials

A	1	top	½	11½	21½
B	2	supports	1	9¼	10
C	1	strip	¼	¾	22
D	2	strips	¼	¾	12
E	2	strips	¼	¾	3
F	2	strips	¼	¾	3½
G	1	strip	¼	¾	12½
H	2	corner strips	1	1	9

Instructions for Assembly

1. Join top (A) with strips (C, D, E, F, G).
2. Attach supports (B) to top (A) and to strip (H).
3. Apply finish.

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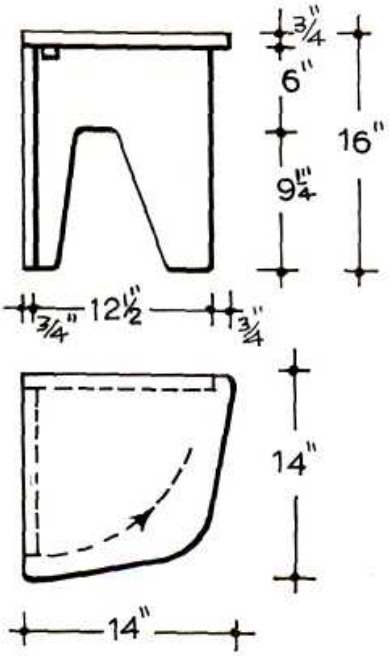
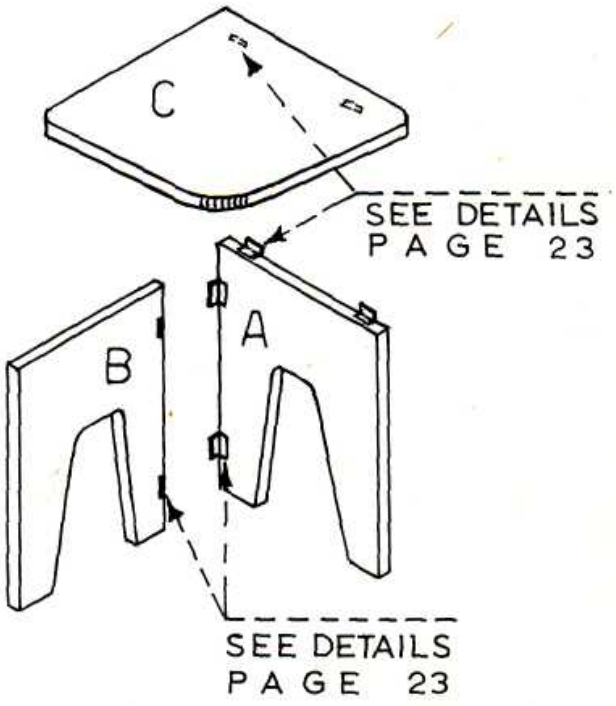
2.6 FOLDING STOOL

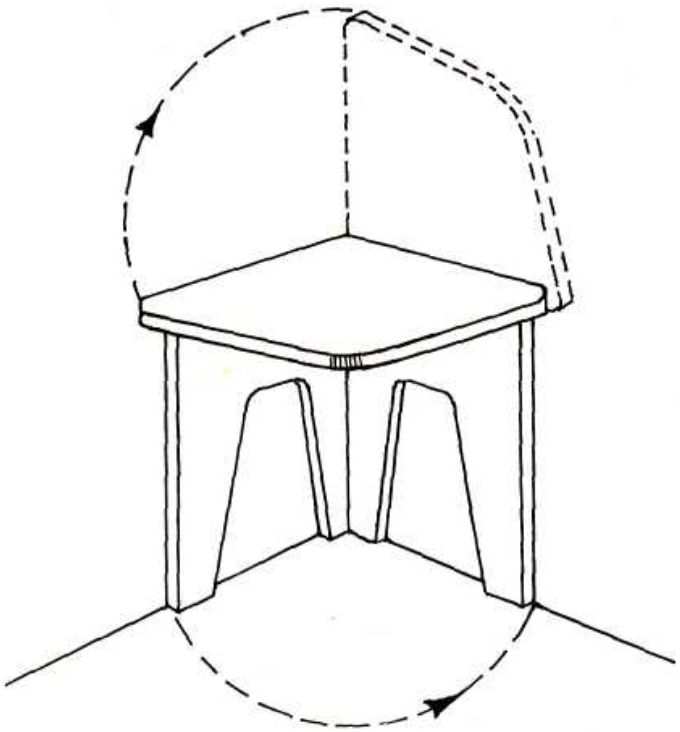
Designed for use by young children, this stool is not only very practical, but it may prevent accidents in the bath as well.



List of Materials

A	1	side	¾	13¼	15¼
B	1	side	¾	12½	15¼
C	1	top	¾	14	14





Instructions for Assembly

1. Join side (B) to side (A) and top (C) to (A) with hinges.
2. Apply finish.

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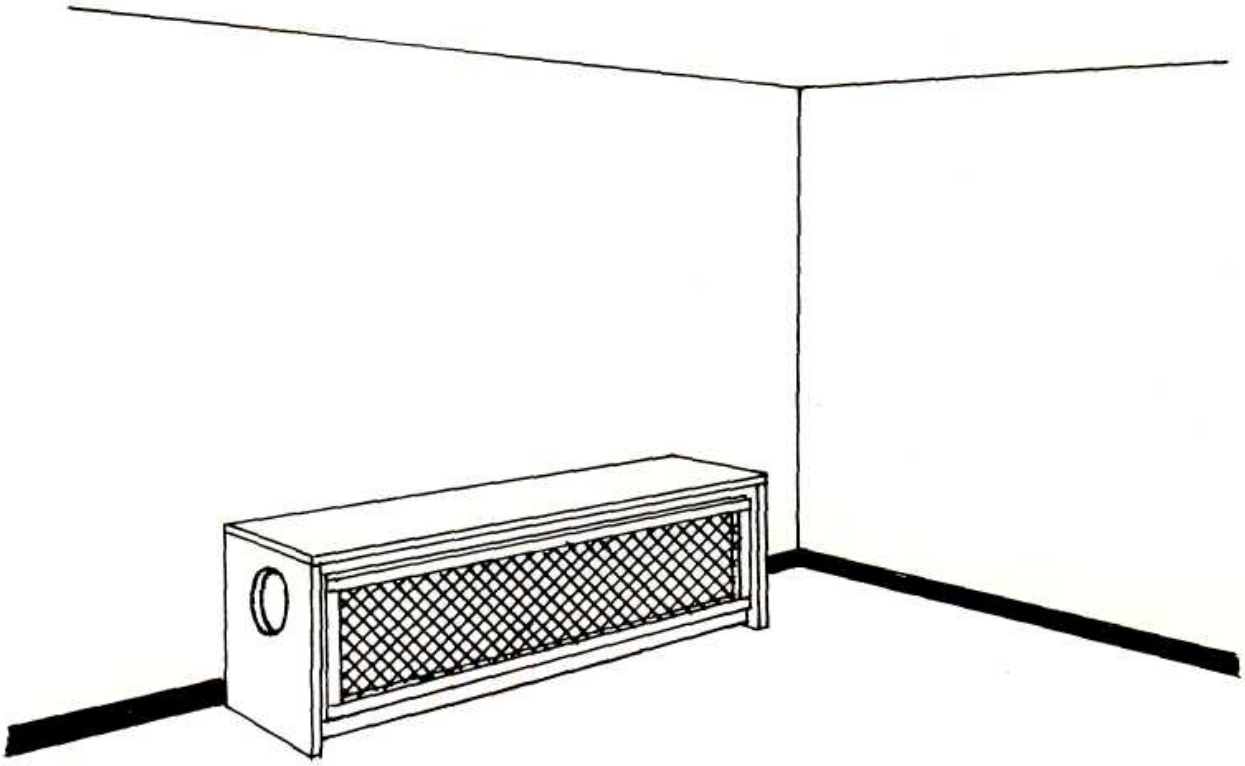
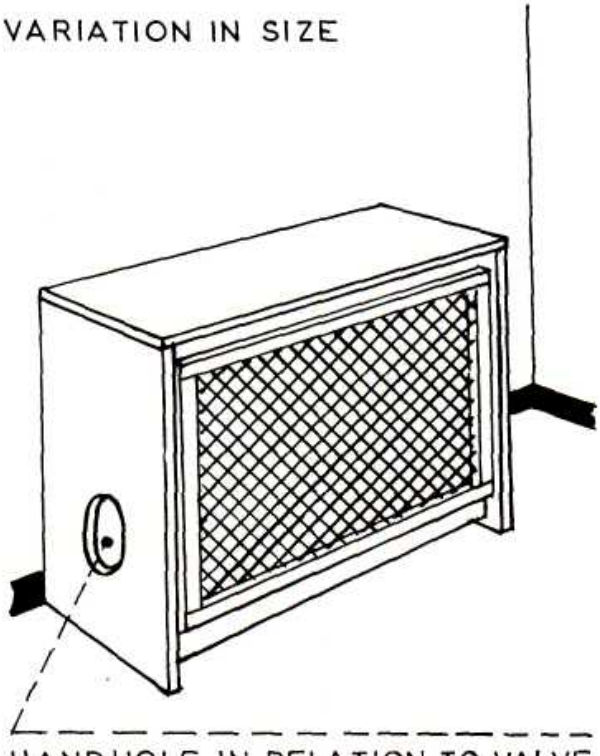
3.1 RADIATOR ENCLOSURE

Besides its aesthetic value, this radiator cover protects young children from bruises and burns, and the bottom rail prevents marbles and other small objects from rolling under the radiator. Dimensions are adaptable to size of radiator.



VARIATION IN SIZE



HANDHOLE IN RELATION TO VALVE

List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length		
A	1	top	¾	*W*	*D*
B	2	sides	¾	*H*	*D*
C	2	rails	1	2	*W* less 1½
D	2	rails	¾	1¼	*W* less 2½
E	2	rails	¾	1¼	*H* less 6½
F	1	sheet of expanded metal	*H* less 6 in.		*W* less 3 in.

Instructions for Assembly

1. Join side (B) with rail (C) and attach top (A).
2. Fasten rails (D) to (E) and attach metal sheet (F).
3. Join rail (D) to rail (C) and sand finish.
4. Install enclosure over radiator.

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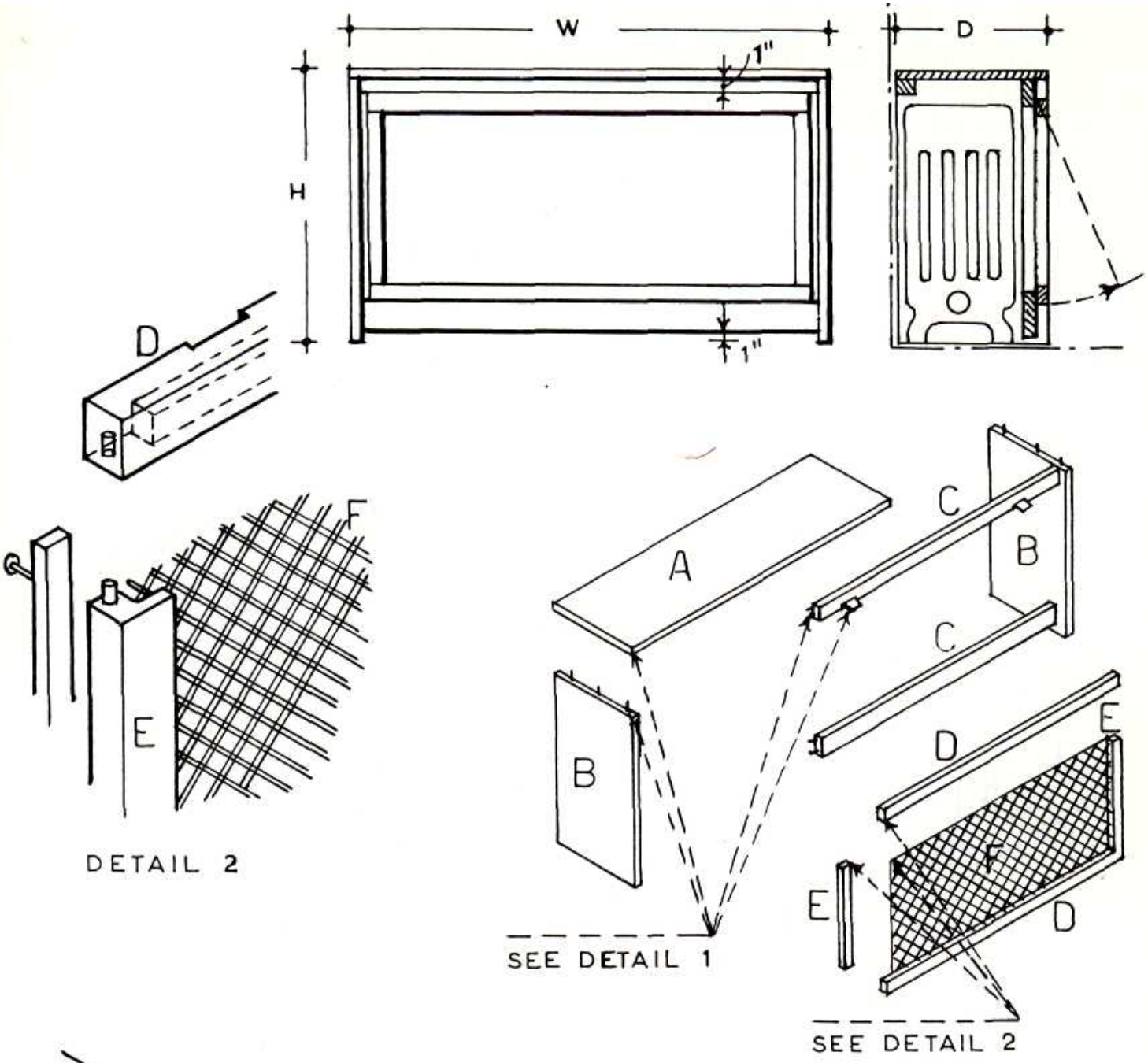

H = HEIGHT OF RADIATOR + 2"

W = WIDTH OF RADIATOR + 4"

D = DEPTH OF RADIATOR + 2"

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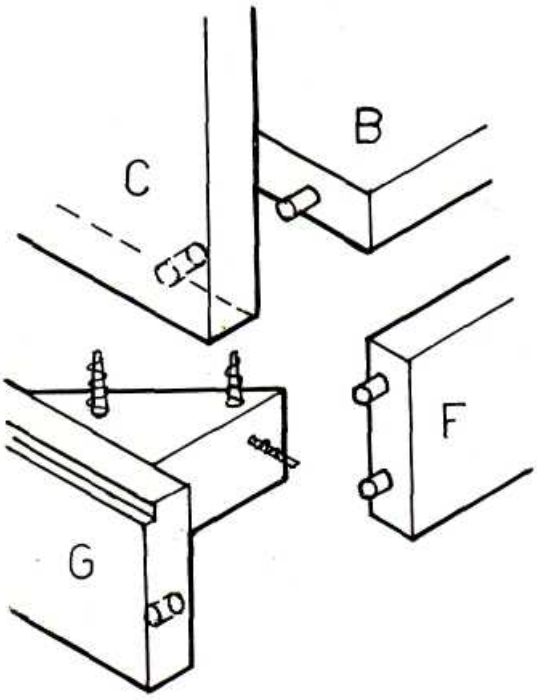
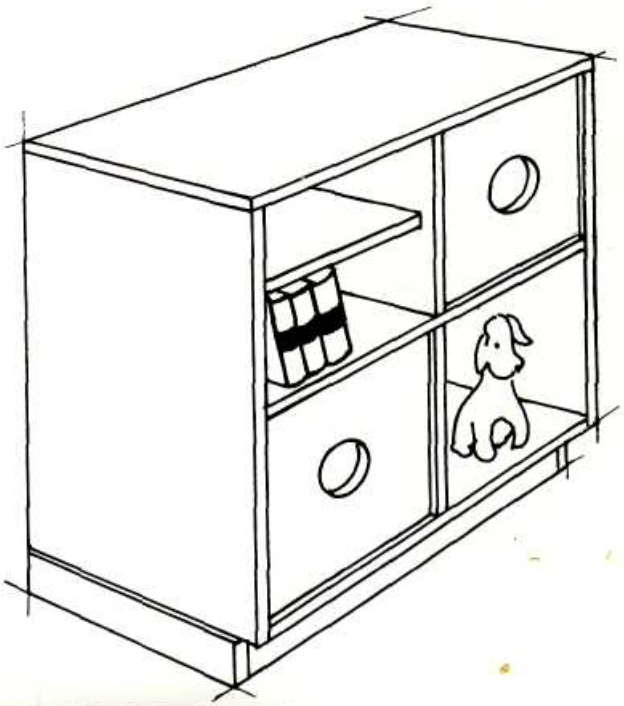
3.2 MODULAR BOOKCASE

An original and practical unit that adds a note of vivacity to any room. Groups can be built up as desired, with or without the central shelf. You can add as many modules as you wish, either vertically or horizontally.

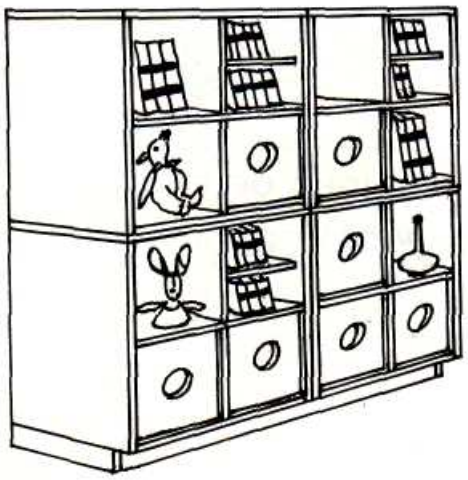


DETAIL I



List of Materials

A	1	top	¾	15	28¼
B	2	bottom & shelf	¾	14¾	26¾
C	2	sides	¾	15	27½
D	1	partition	¾	14¾	26¾
E	1	back	¼	27¾	28
F	1	toeplate	¾	2¾	26¾
G	2	toeplates	¾	2¾	15
H	1	front	½	13	13
J	2	sides	½	12½	13
K	1	back	½	12	13
L	1	bottom	½	12	12



Instructions for Assembly

1. Join shelf and bottom (B) to partition (D); then sides (C) and top (A).
2. Attach back (E) and toeplates (F, G) to cabinet bottom (B).
3. Join bottom (L) to back (K); then sides (J) and front (H).
4. Apply finish.

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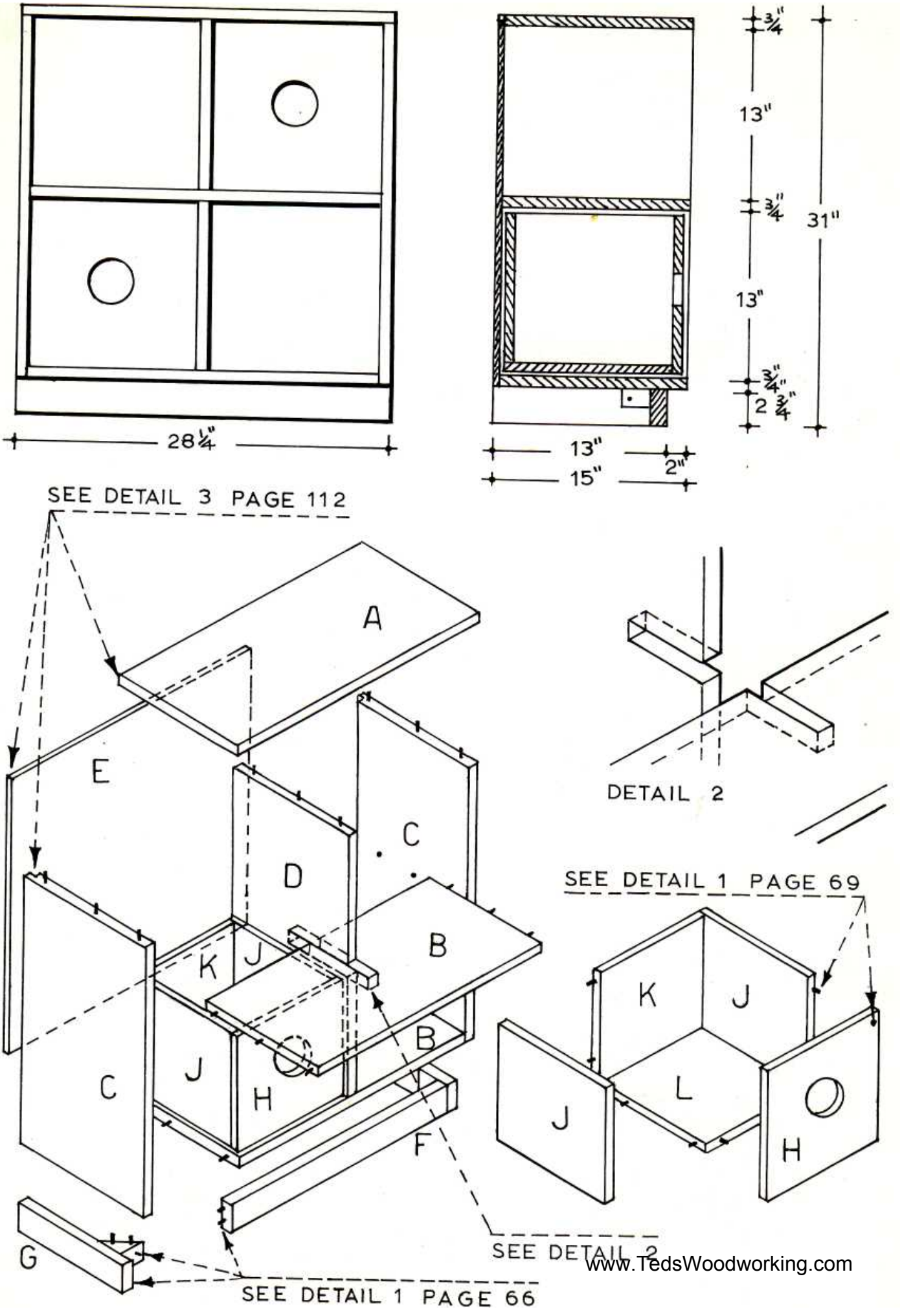

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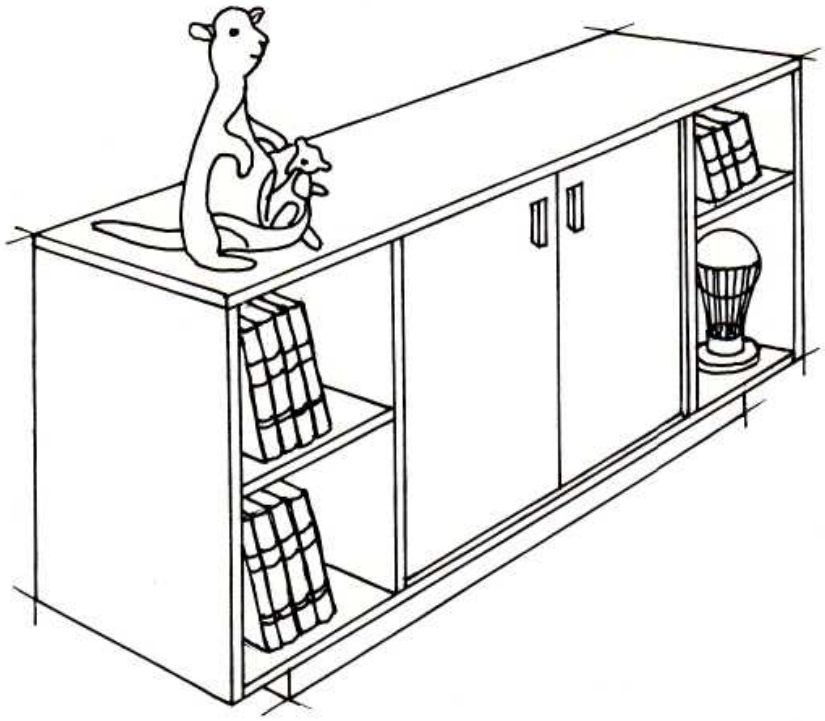
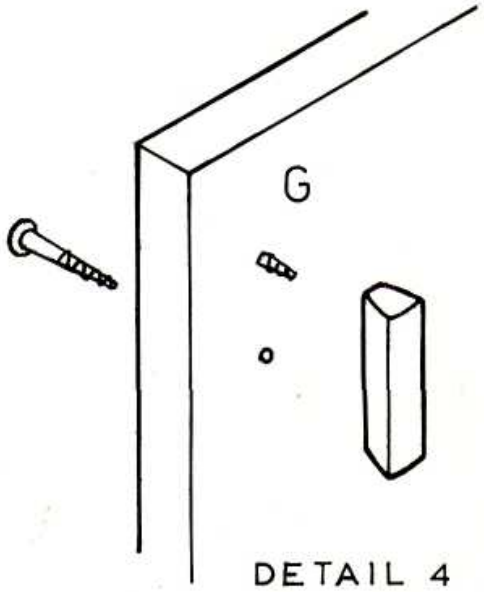
3.3 BOOKCASE CABINET

A piece of furniture of this type is always expensive to buy. This project is easy to make, and its cost is relatively low. We suggest plywood as the construction material.





DETAIL 4

Instructions for Assembly

A	1	top	¾	15	66
B	1	bottom	¾	14¾	64½
C	2	sides	¾	15	25¼
D	2	partitions	¾	14¾	24½
E	1	back	¼	25½	65½
F	1	shelf	¾	14¾	34½
G	2	shelves	¾	14¾	14¼
H	2	doors	¾	17¼	24½
J	1	toeplate	¾	3	58
K	2	toeplates	¾	3	13

List of Materials

1. Fasten shelf (F) and bottom (B) to partitions (D) and sides (C); then attach top (A).
2. Install back (E).
3. Join toeplates (J, K) to corner blocks, and fasten to bottom (B).
4. Apply finish and set cabinet in place.

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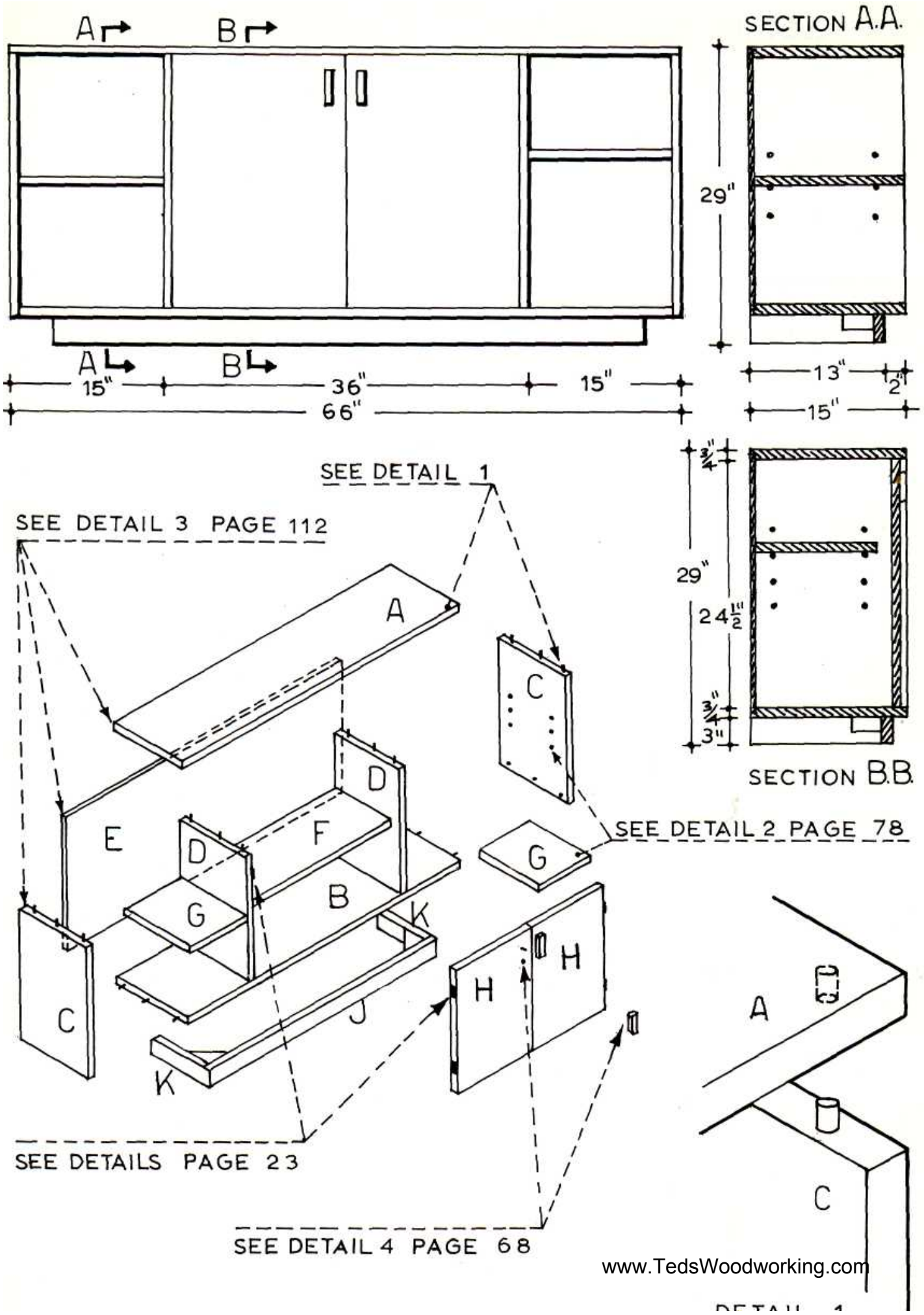

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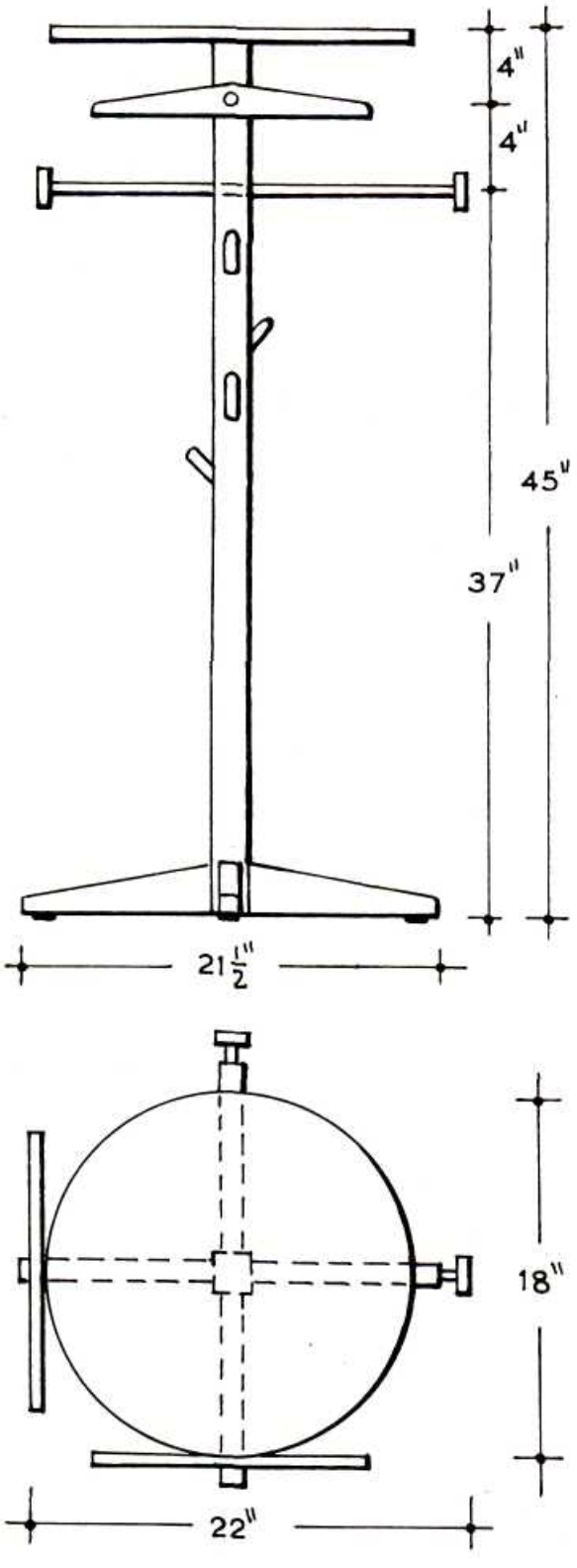
3.4 CLOTHES TREE

How can we train young ones to hang up their clothes if they can't reach the closet rack? This child-size clothes tree makes it fun to hang things up—and take them down. The top shelf holds school books, games or assorted pieces of play equipment.

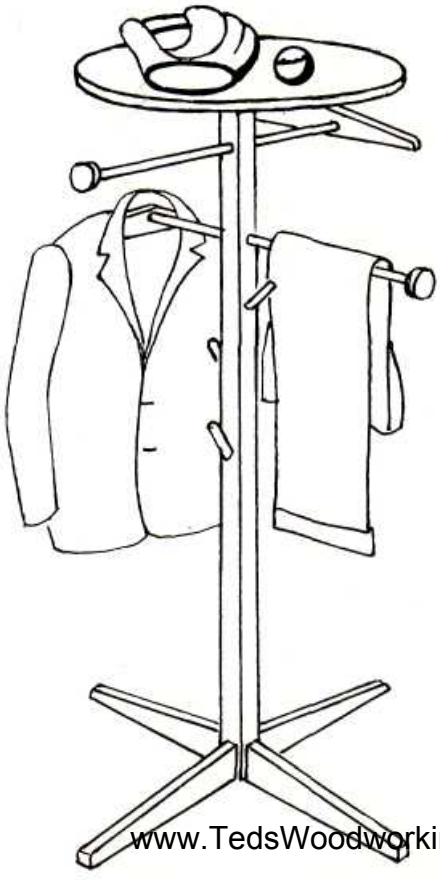


List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length
A	1	top	¾ × 18 in. diam.
B	1	support	1½ × 1½ × 45
C	4	legs	1 × 2½ × 10
D	2	dowels	¾ diam. × 22
E	2	hangers	¾ × 1½ × 14
F	2	hangers	¾ × 2 in. diam.
G	4	hook	½ diam. × 5

Instructions for Assembly

1. Join support (B) with legs (C).
2. Insert dowels (D) in support (B) and attach hangers (E) and (F) to dowels (D).
3. Install top (A) and hook (G) to support (B).
4. Apply finish.



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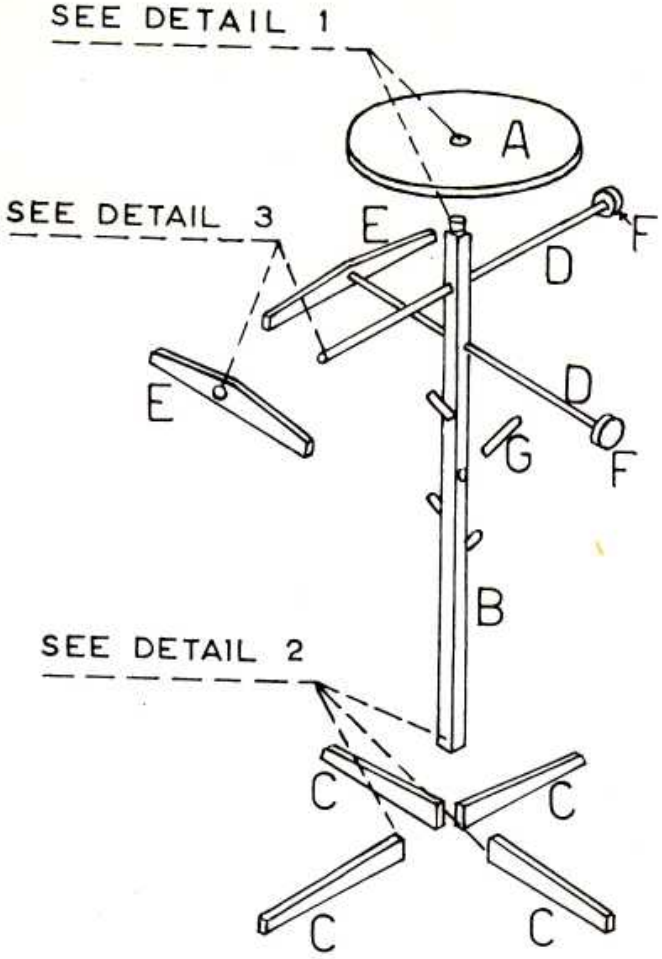
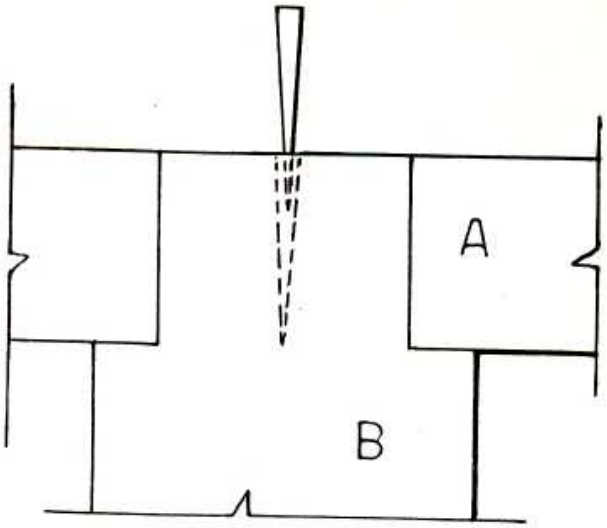
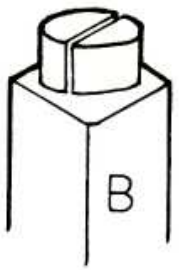
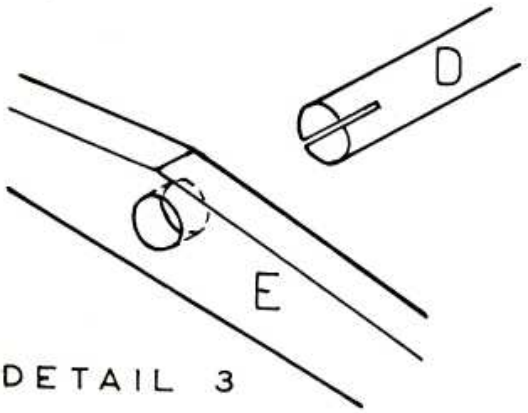


DETAIL 1 FULL SIZE



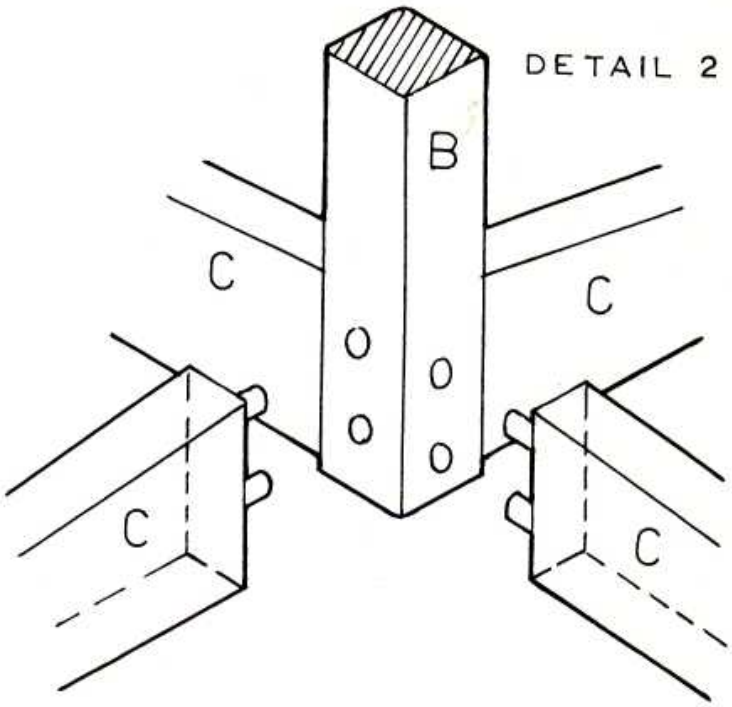
DETAIL 1





DETAIL 3

DETAIL 2



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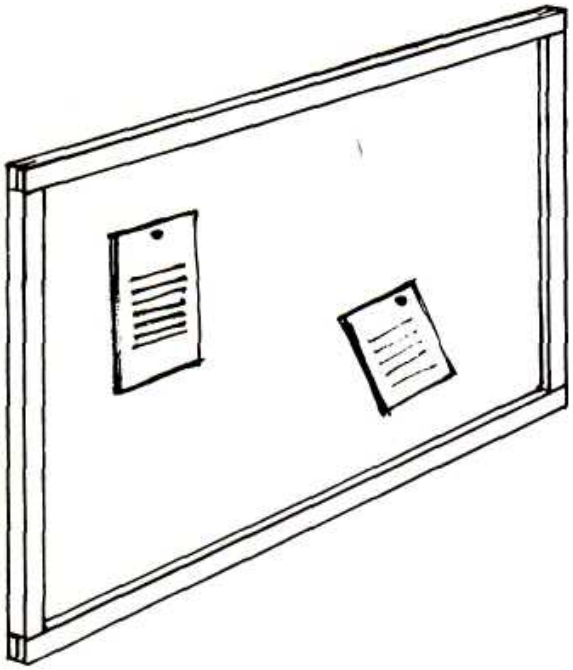
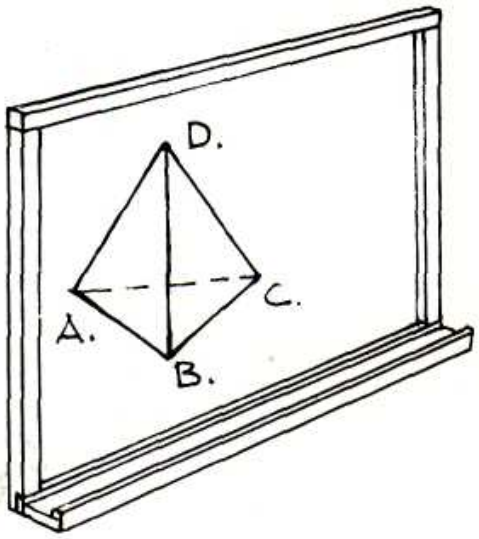
3.5 BULLETIN BOARD OR CHALKBOARD

Both are useful all the way from preschool to high school. For a bulletin board, use soft wallboard to take thumbtacks. For a chalkboard, add the lower ledge and use hard-surfaced Masonite covered by green chalkboard paint.





List of Materials

Bulletin Board

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness	× width	× length
A	2	rails	¾	1¼	30
B	2	rails	¾	1¼	21
C	1	wallboard or cork panel	3/16	19½	28½
D	1	plywood panel	¼	19½	28½
		Chalkboard			
A	2	rails	¾	1¼	24
B	2	rails	¼	1¼	18
C	1	Masonite panel	¼	16½	22½
E	1	board	¾	⅜	24

Instructions for Assembly

1. Join rails (A) with rails (B).
2. Install wallboard or cork (C) with plywood back (D) for bulletin board.
3. Apply finish.
4. For chalkboard, install the Masonite in place of the wallboard or cork, and paint with green chalkboard paint.

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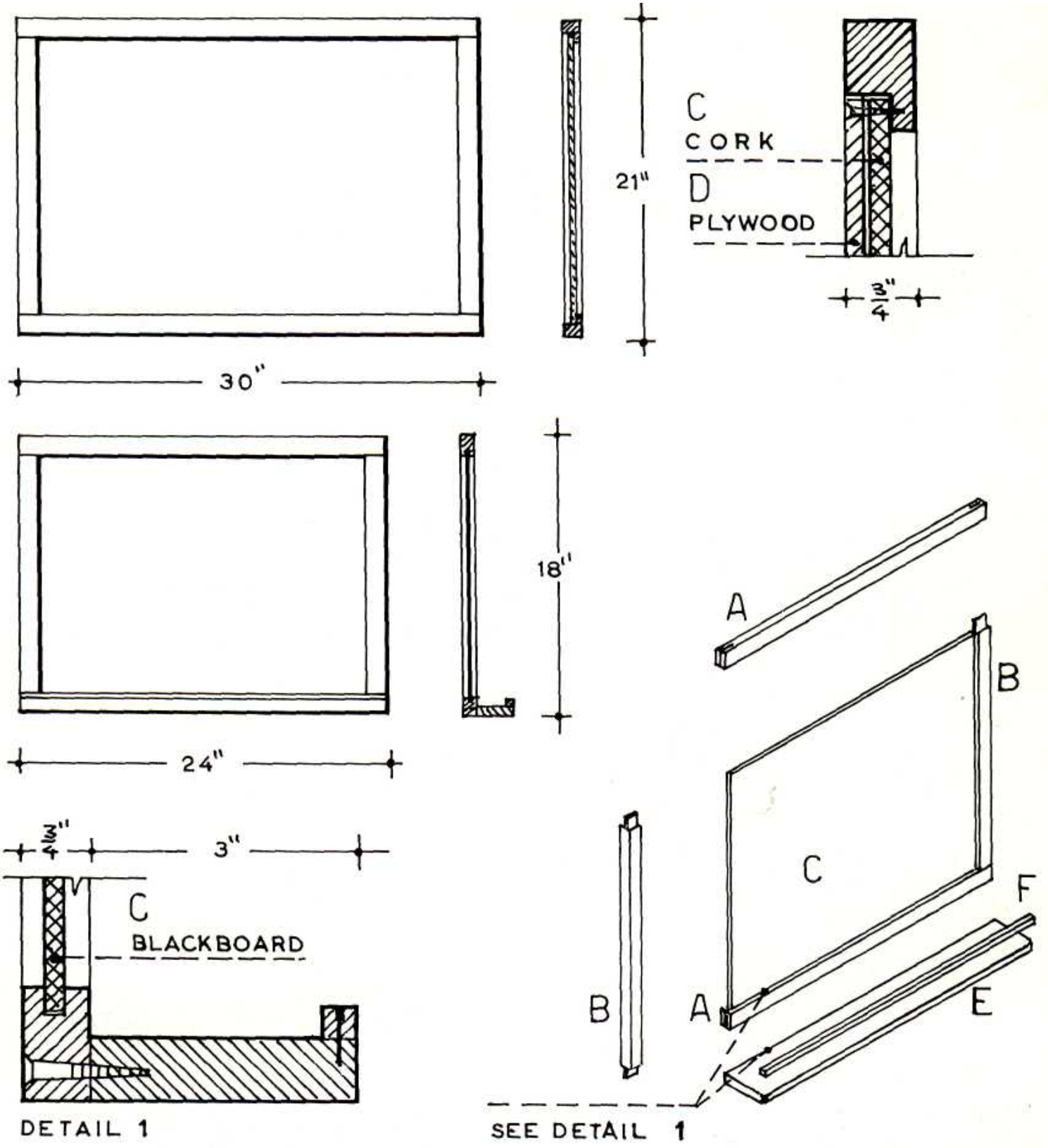

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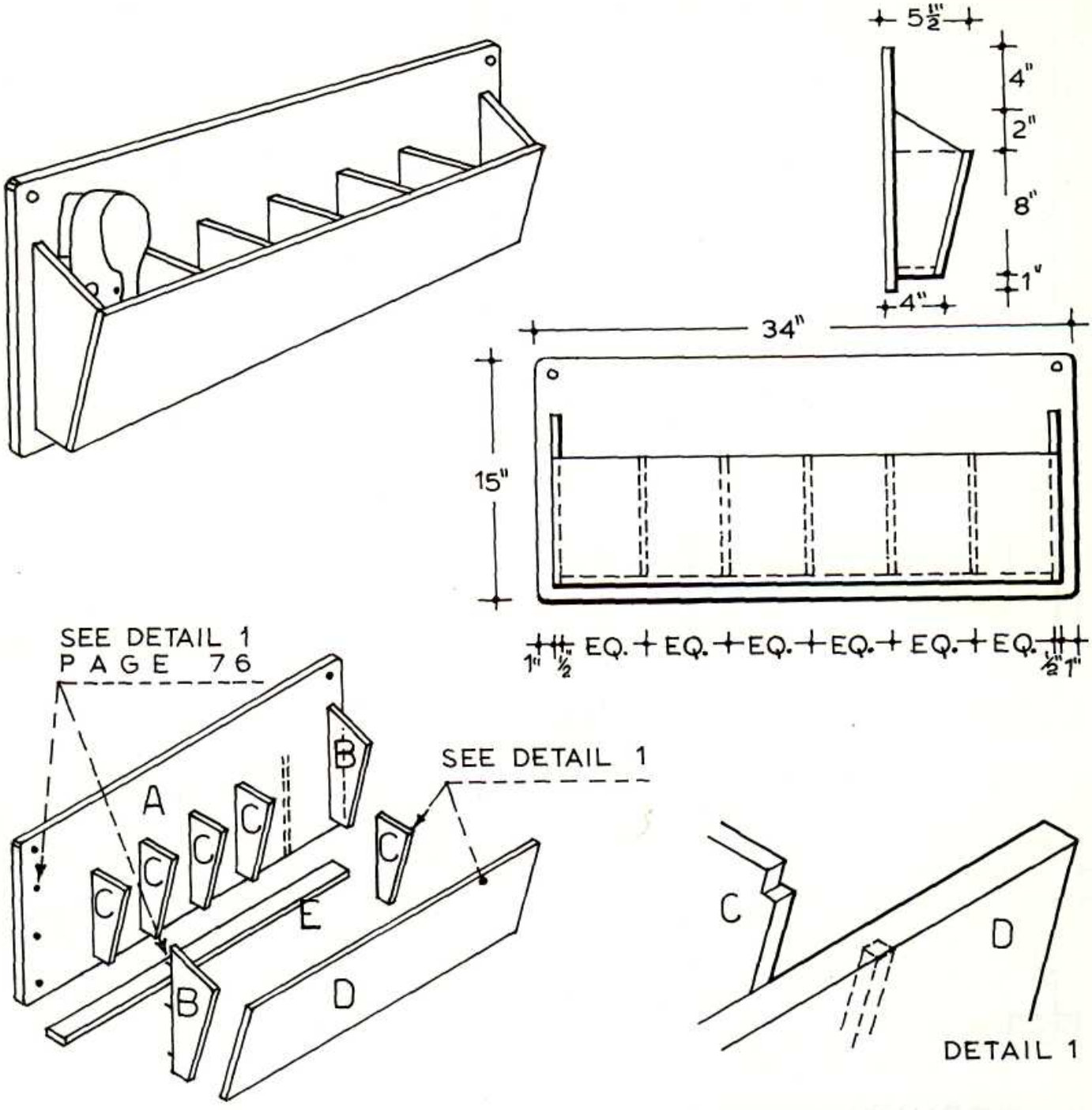
3.6 SHOE RACK

To avoid having children's shoes scattered on the closet floor, build one or more of these easy-to-make shoe racks. The rack can be attached inside the closet door, and its length



List of Materials

A	1	back	½	15	34
B	2	sides	½	4½	10
C	5	partitions	¼	4½	8
D	1	front	½	8½	32
E	1	bottom	½	3	32

Instructions for Assembly

1. Join back (A) with sides (B) and bottom (E).
2. Insert partitions (C) in back (A) and fasten front (D).
3. Apply finish.

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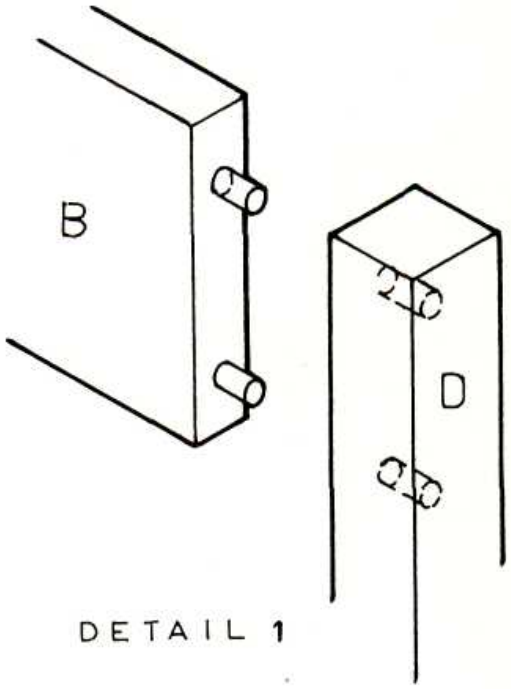
4.1 KNEEHOLE DESK

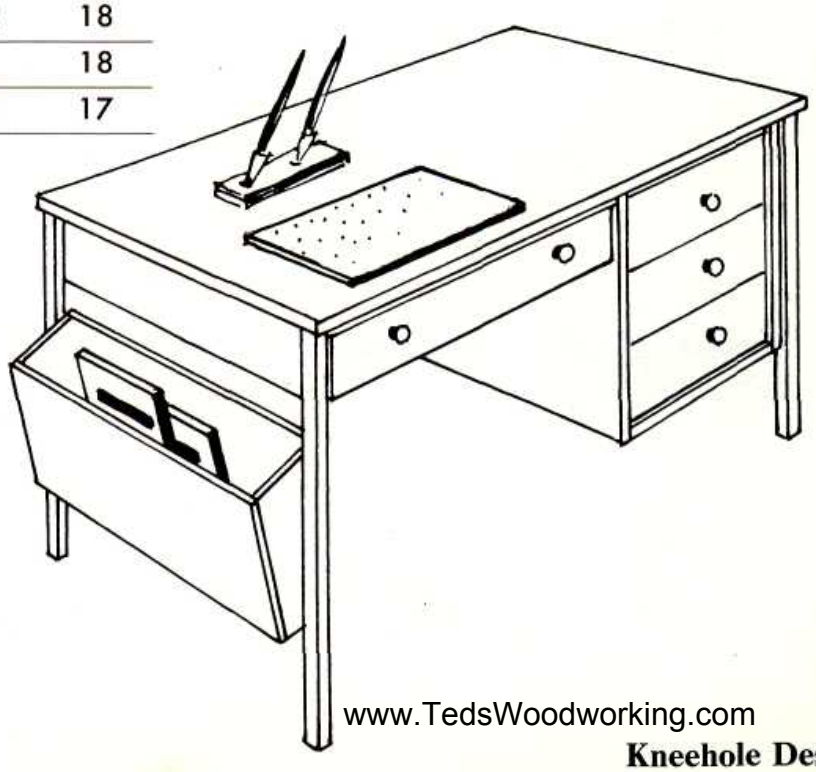
Not too difficult to make yet good-looking, sturdy and practical for any room in the house. Note the left-hand well for magazines and outsize books. Instead of paint or lacquer many do-it-yourselfers use "contact" plastic covering, which can be had in a variety of wood grains and colors.

List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness	× width	× length
A	1	top	¾	22	42
B	1	rail	¾	4	18
C	1	rail	¾	4	23
D	4	legs	1¼	1½	27¼
E	2	sides	¾	19¾	19½
F	2	pieces	¾	19	14½
G	1	back	¾	14½	19½
H	8	cleats	⅜	½	19
J	1	rail	¾	2	23
K	3	drawer fronts	¾	6	14½
L	6	drawer sides	½	6	18⅝
M	3	drawer backs	½	5½	13½
O	3	drawer bottoms	¼	14	18½
P	1	drawer front	¾	3¼	23
Q	1	drawer back	½	2¾	22
R	2	drawer sides	½	3¼	18⅝
S	1	drawer bottom	¼	22½	18½
T	2	sides	½	5½	12
U	1	back	½	12	18
V	1	front	½	11	18
W	1	bottom	½	2	17



DETAIL 1



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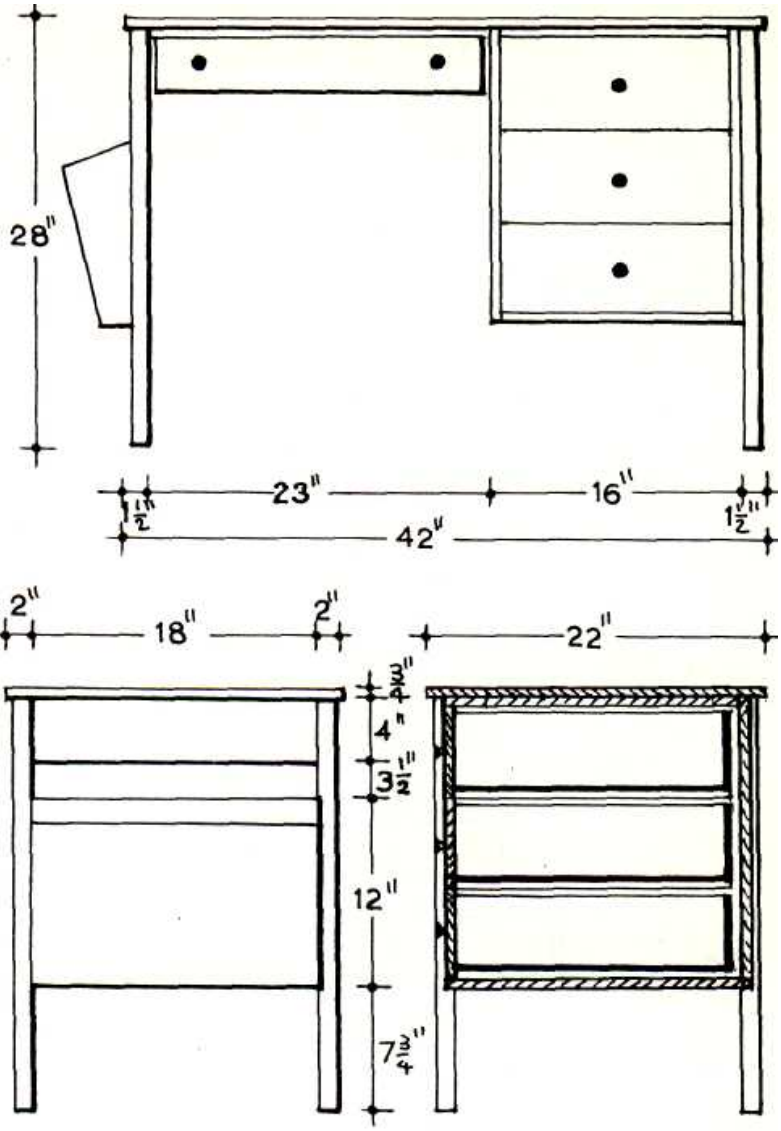
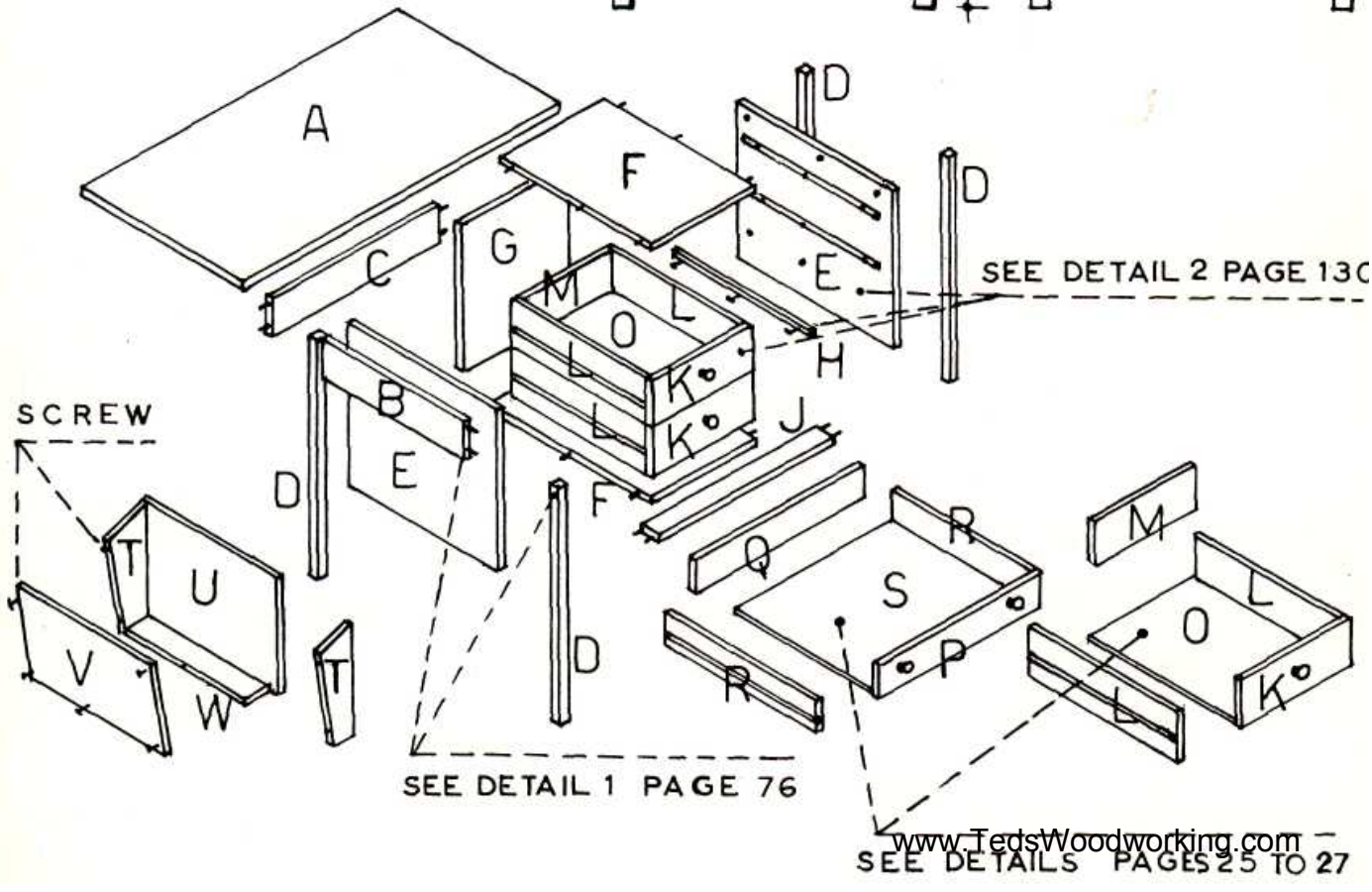
Instructions for Assembly

1. Fasten pieces (F) with sides (E) and back (G).
2. Join legs (D) with rails (B) and (C) and with sides (E) and rails (J).
3. Fasten top (A) to frame thus formed.
4. Attach cleats (H) to rail (B) and sides (E).
5. Join drawer side (L) with drawer front (K) and back (M), and install drawer bottom (O).
6. Join drawer sides (R) with fronts (P) and back (Q) and install bottom (S).
7. Fasten back (U) to bottom (W), sides (T), front (V) and attach to legs (D).
8. Apply finish.





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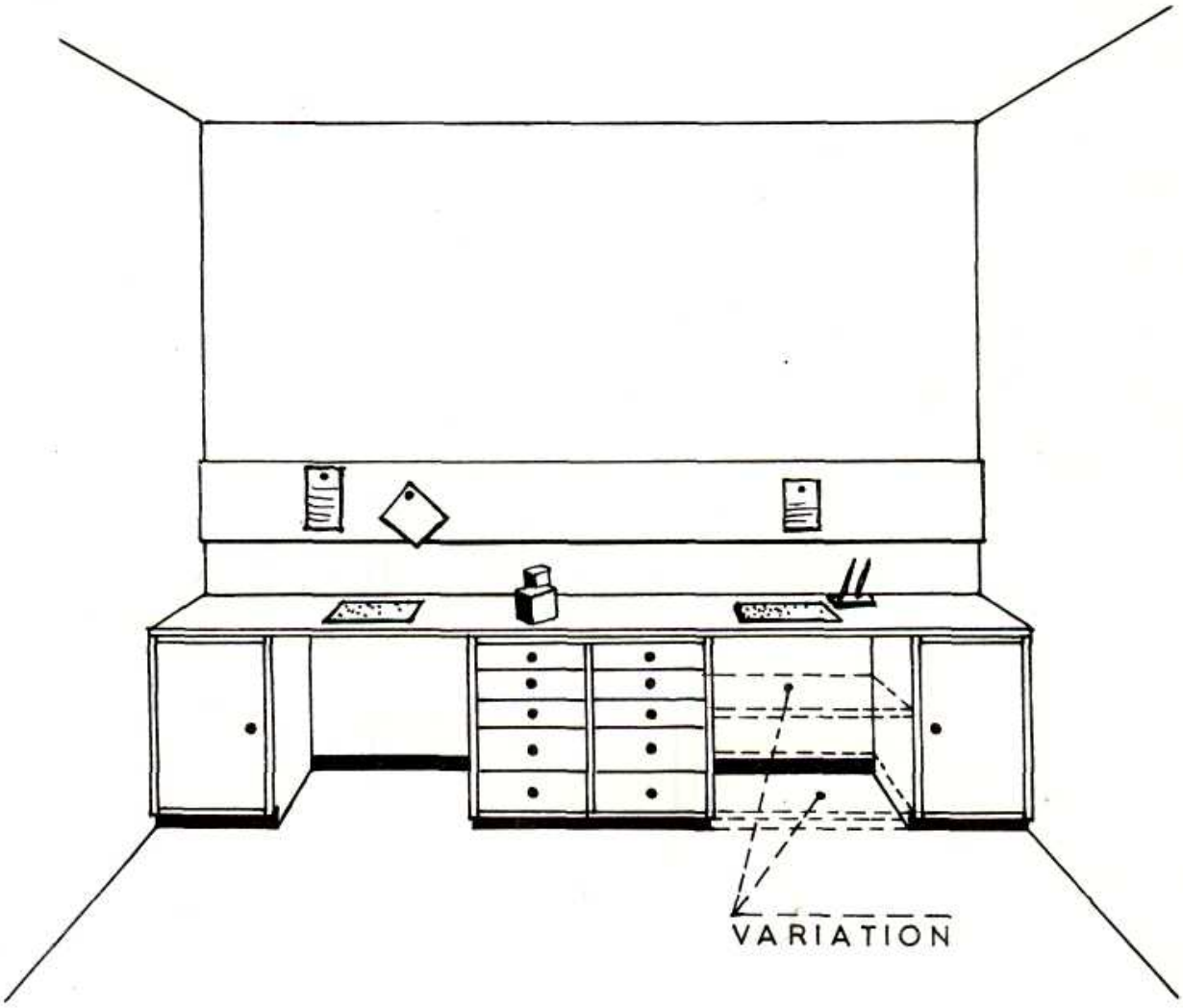
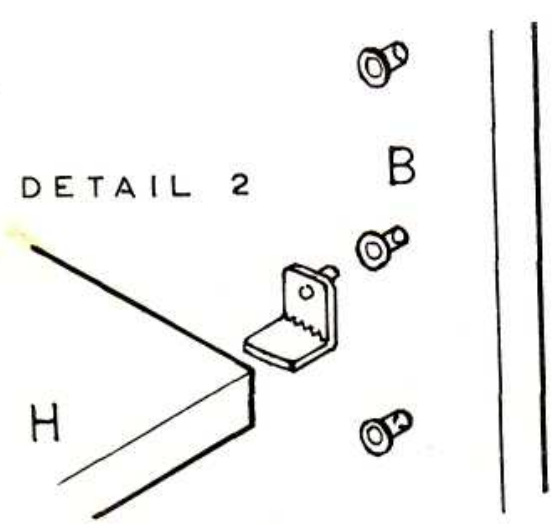
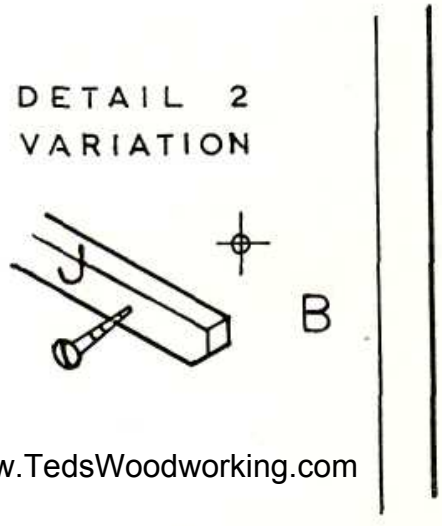
4.2 BUILT-IN DESK

Besides making full use of the space between two closets, this design provides extra work space for drawing—or play space for games. Teen-agers with lots of books and papers for "research" assignments will appreciate the larger working surface. A wall-to-wall bulletin board over the desk or a large map will be both esthetic and functional.







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List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness	×	width	×	length
A	1	top	1		18		W
B	6	sides	¾		17		27
B	1	partition	¾		16¾		24
C	8	tops and bottoms	¾		14½		17
D	4	backs	¼		15½		23½
E	2	doors	¾		14½		22½
F	2	bases	¾		3		14½
G	1	base	¾		3		29¾
H	2	shelves	¾		14½		15
J	20	cleats	⅜		¾		14
K	6	drawer fronts	¾		3½		14½
L	6	drawer backs	½		3		13½
M	12	drawer sides	½		3½		16⅜
O	10	drawer bottoms	¼		14		16¼
P	4	drawer fronts	¾		6		14½
Q	4	drawer backs	½		5½		13½
R	8	drawer sides	½		6		16⅜
T	2	add'l shelves	¾		16¾		W^2
U	1	toe plate	¾		3		W^2

Instructions for Assembly

1. Join sides (B) with tops and bottoms (C).
2. Install backs (D).
3. Fasten toeplate or bases (F) and (G) to sides (B) and bottoms (C).
4. Attach cleats (J) to sides (B) and install doors (E) and shelves (H).
5. Join drawer sides (M) to drawer fronts (K) and backs (L) and install drawer bottoms (O).
6. Join drawer sides (R) to drawer fronts (P) and backs (Q) and install drawer bottoms (O).
7. Apply finish.
8. Set cabinet in place and fasten top (A).
9. Add shelves (T) and toeplate (U) if variation is desired.

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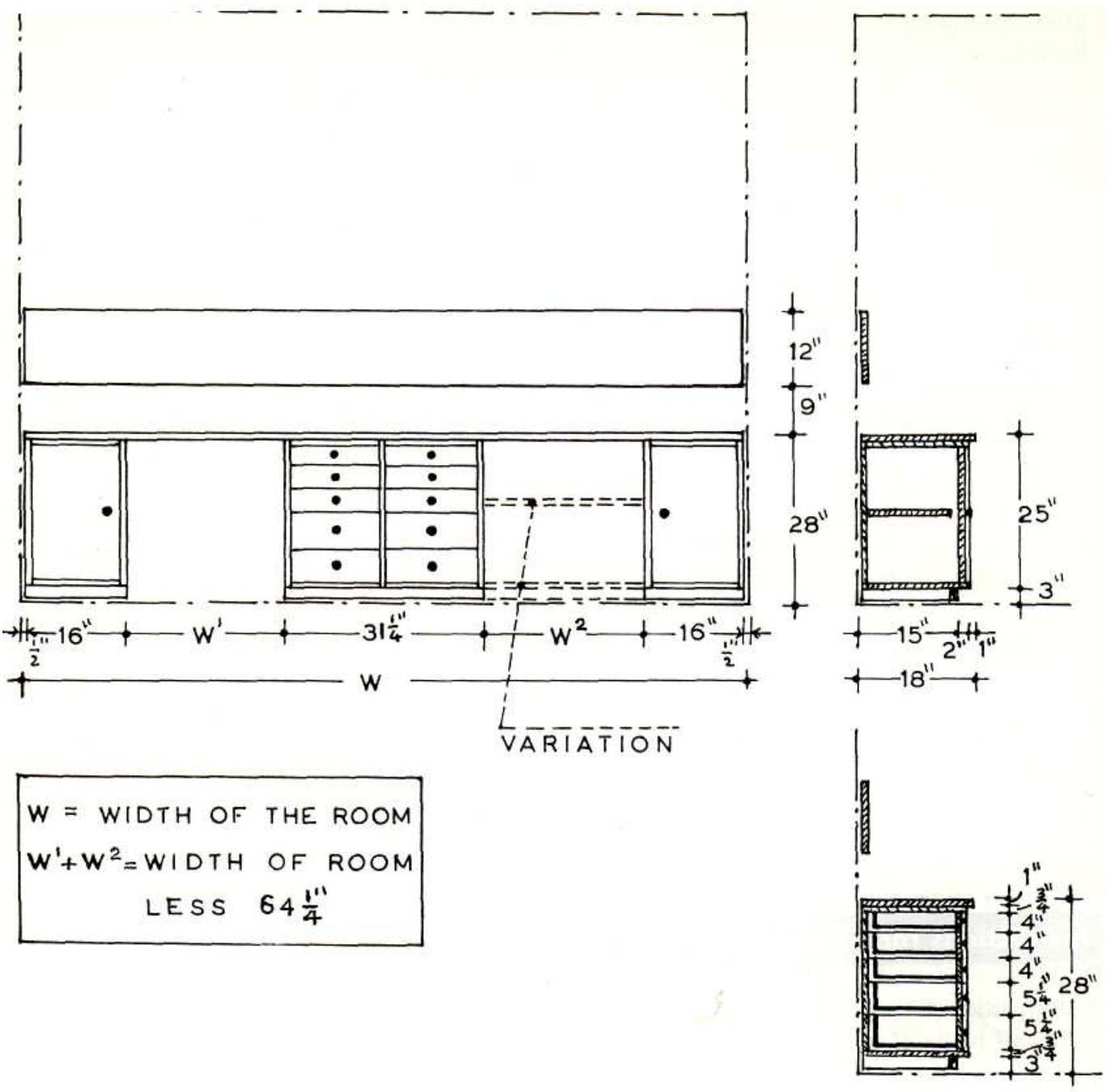
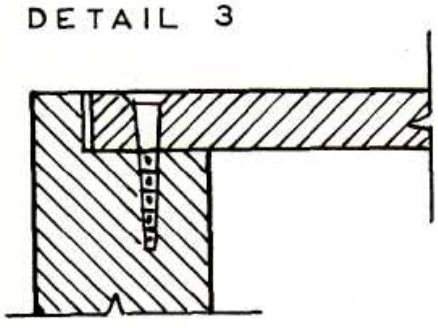
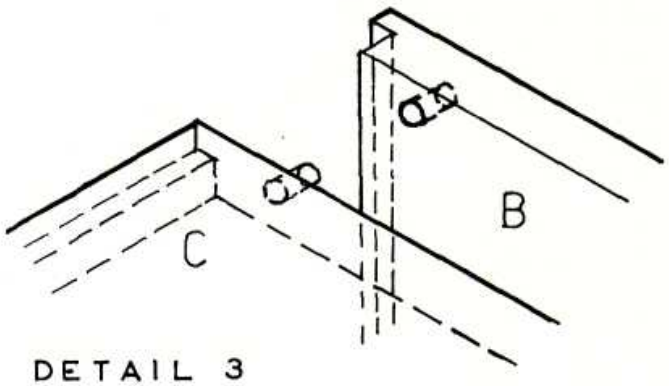


W = WIDTH OF THE ROOM

W'+W²=WIDTH OF ROOM LESS 64 1/4"

DETAIL 3





DETAIL 3

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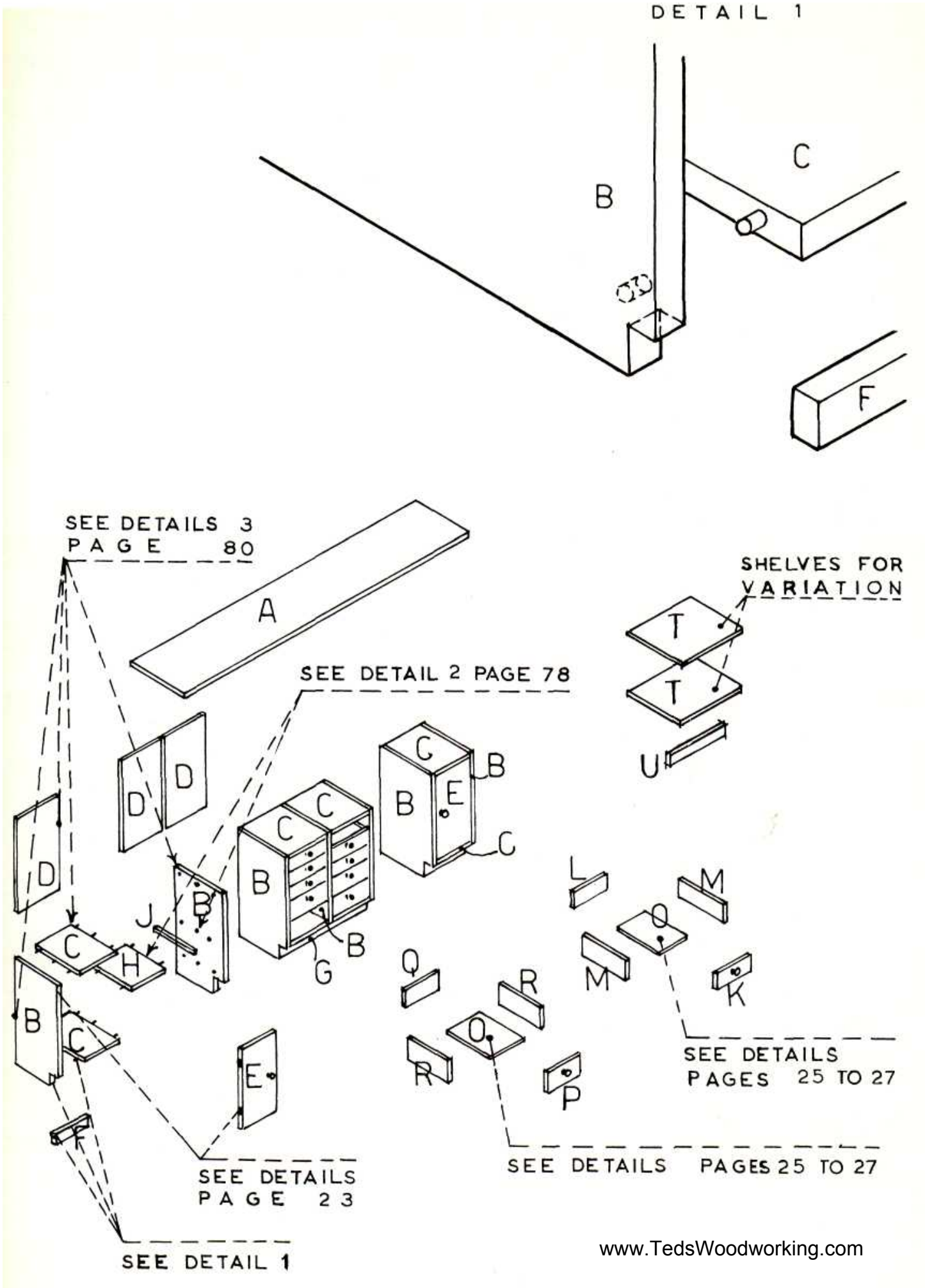

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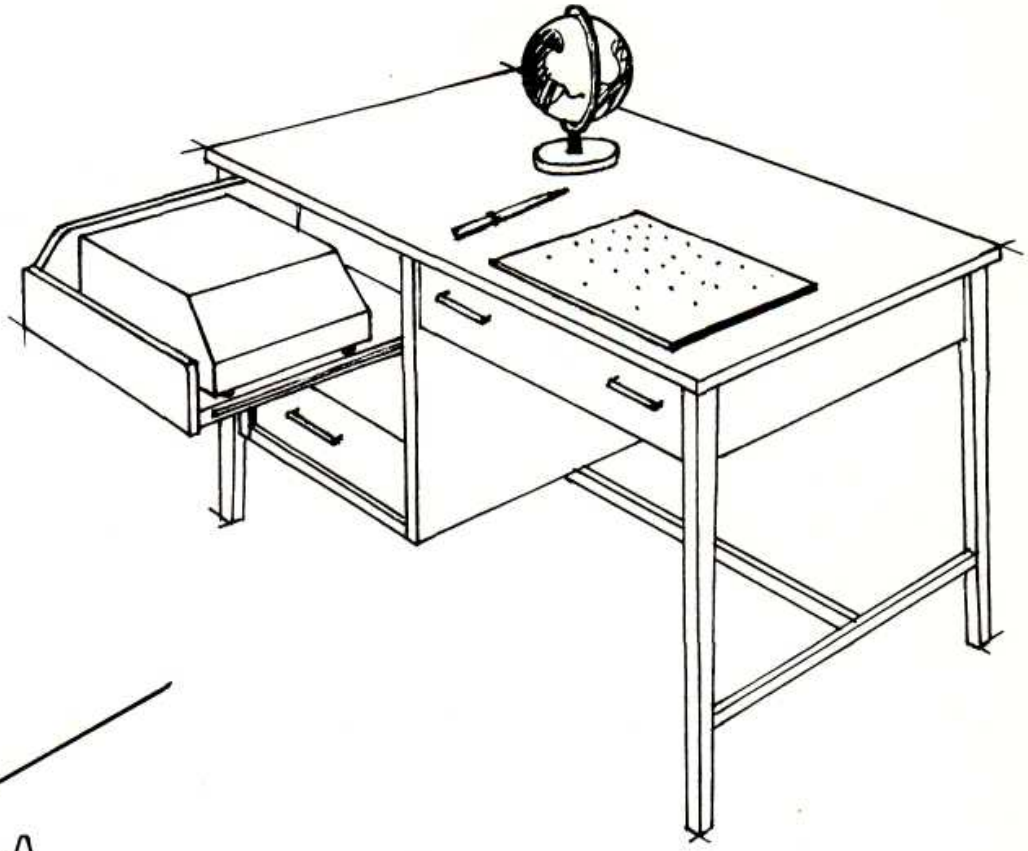
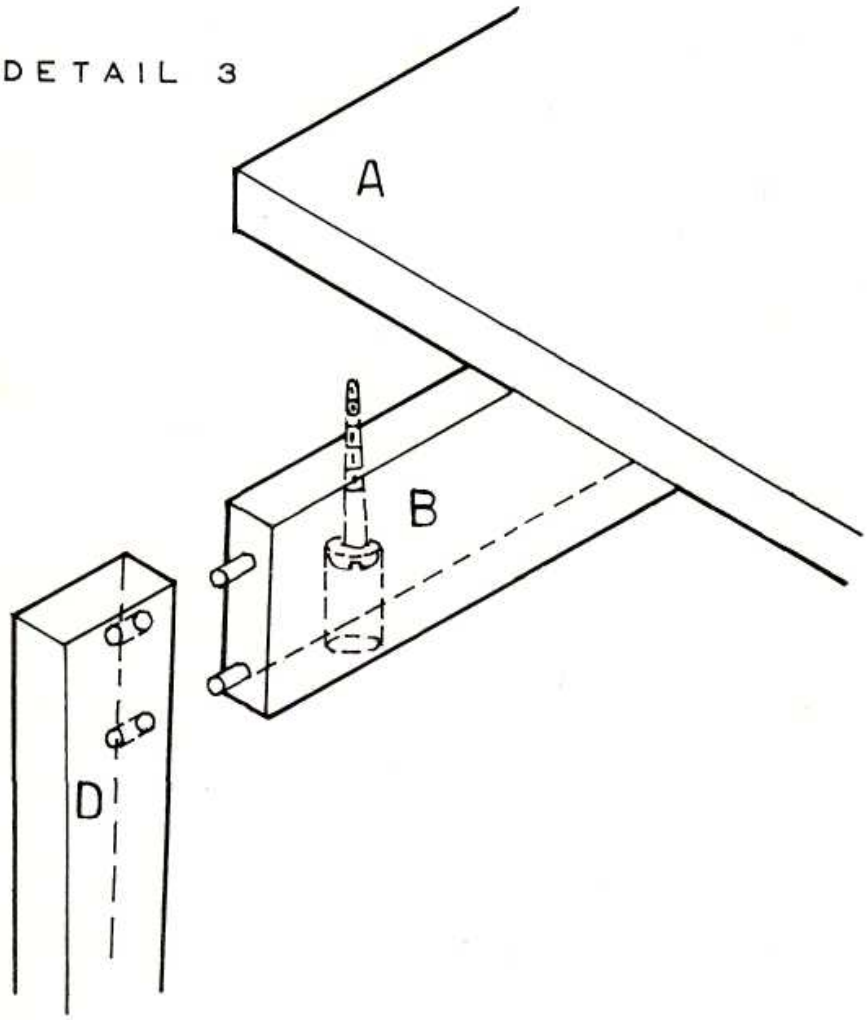
4.3 TYPEWRITER DESK

Building this "portable typewriter" desk requires a little more skill and accuracy than the desk of Project 4.1, but your efforts will be amply rewarded. The top drawer front is made half height to permit free travel of the typewriter carriage. Commercial drawer slides may be substituted if desired.



DETAIL 3



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List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness	×	width	×	length
A	1	top	1		26		44
B	2	rails	¾		4½		20½
C	1	rail	¾		4		22
D	4	legs	1		2		28
E	2	stretchers	1		1¼		23
F	1	stretcher	1		1¼		42
G	2	sides	¾		23		20¾
H	1	back	¾		16½		20
J	1	bottom	¾		16½		23
K	2	pieces	¾		2		18
L	9	cleats	⅜		¾		21
M	1	drawer front	¾		4½		16½
O	1	bottom	¾		15		20½
P	1	side	¾		9		21¼
Q	1	back	¾		9		15¾
R	1	piece	¾		1¼		21¼
S	2	drawer fronts	¾		5½		16½
T	4	drawer sides	½		5½		21¾
U	2	drawer backs	½		5½		15½
V	2	drawer bottoms	¼		16		21½
W	1	drawer front	¾		4½		22
X	2	drawer sides	½		4½		21¾
Y	1	drawer back	½		4		21
Z	1	drawer bottom	¼		21		21½

Instructions for Assembly

1. Join rails (B) and stretchers (E) with legs (D).
2. Fasten sides (G) with back (H), bottom (J) and pieces (K).
3. Join rail (C), sides (G), stretcher (F) with legs (D) and stretcher (E).
4. Attach cleats (L) to sides (B) and (G) and fasten top to rails (B), (C) and (K) with screws.
5. Join drawer sides (P) and (R) with bottom (O), front (M) and back (Q).
6. Join drawer sides (T) with drawer fronts (S), backs (U) and install bottoms (V).
7. Join drawer sides (X) with drawer front (W) and back (Y) and install bottom (Z).
8. Apply finish.

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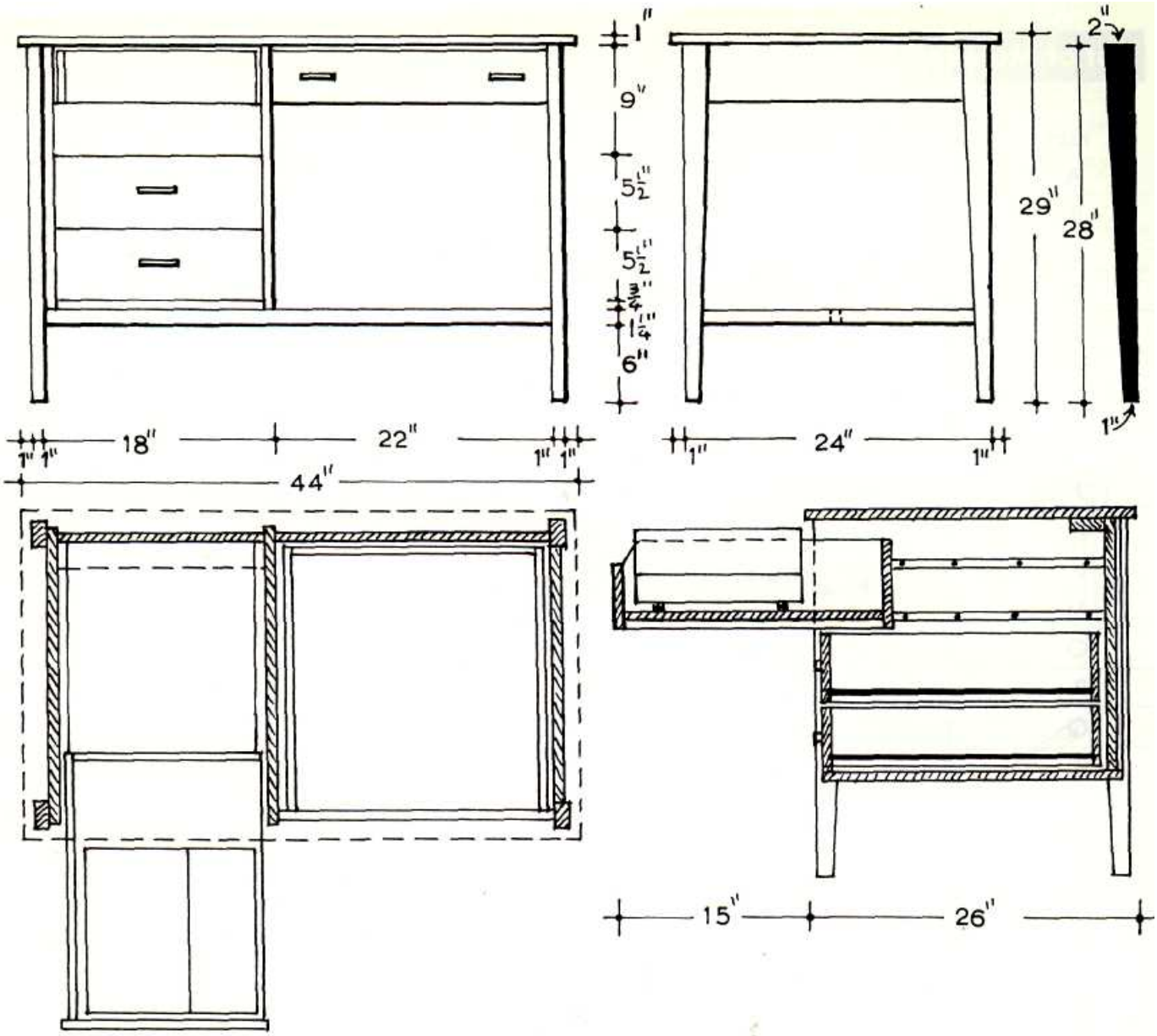
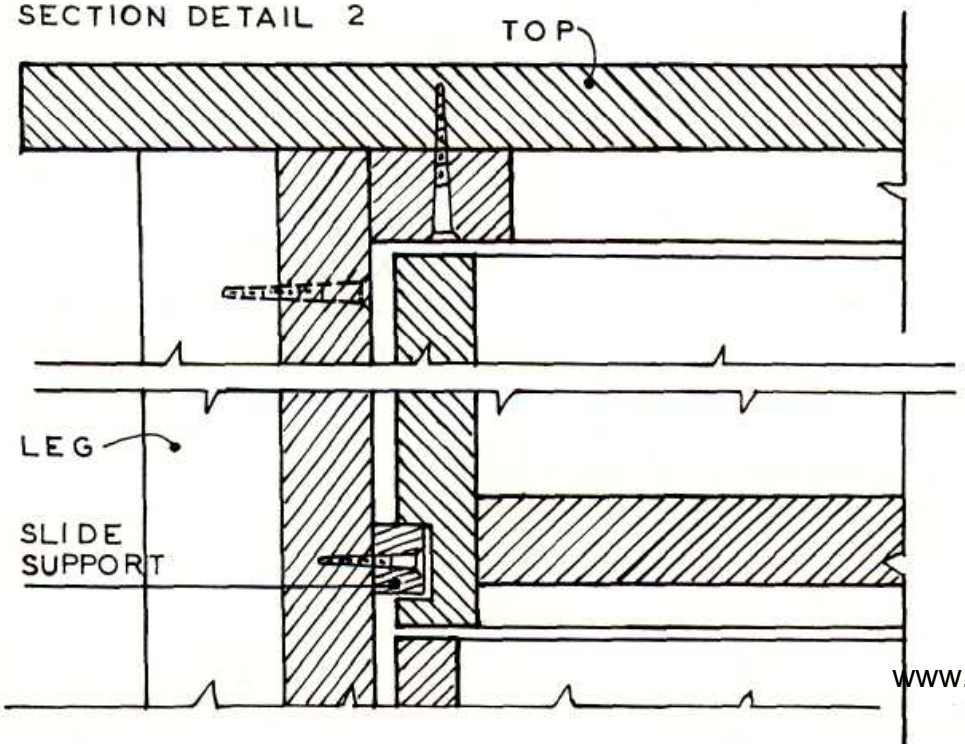


SECTION DETAIL 2



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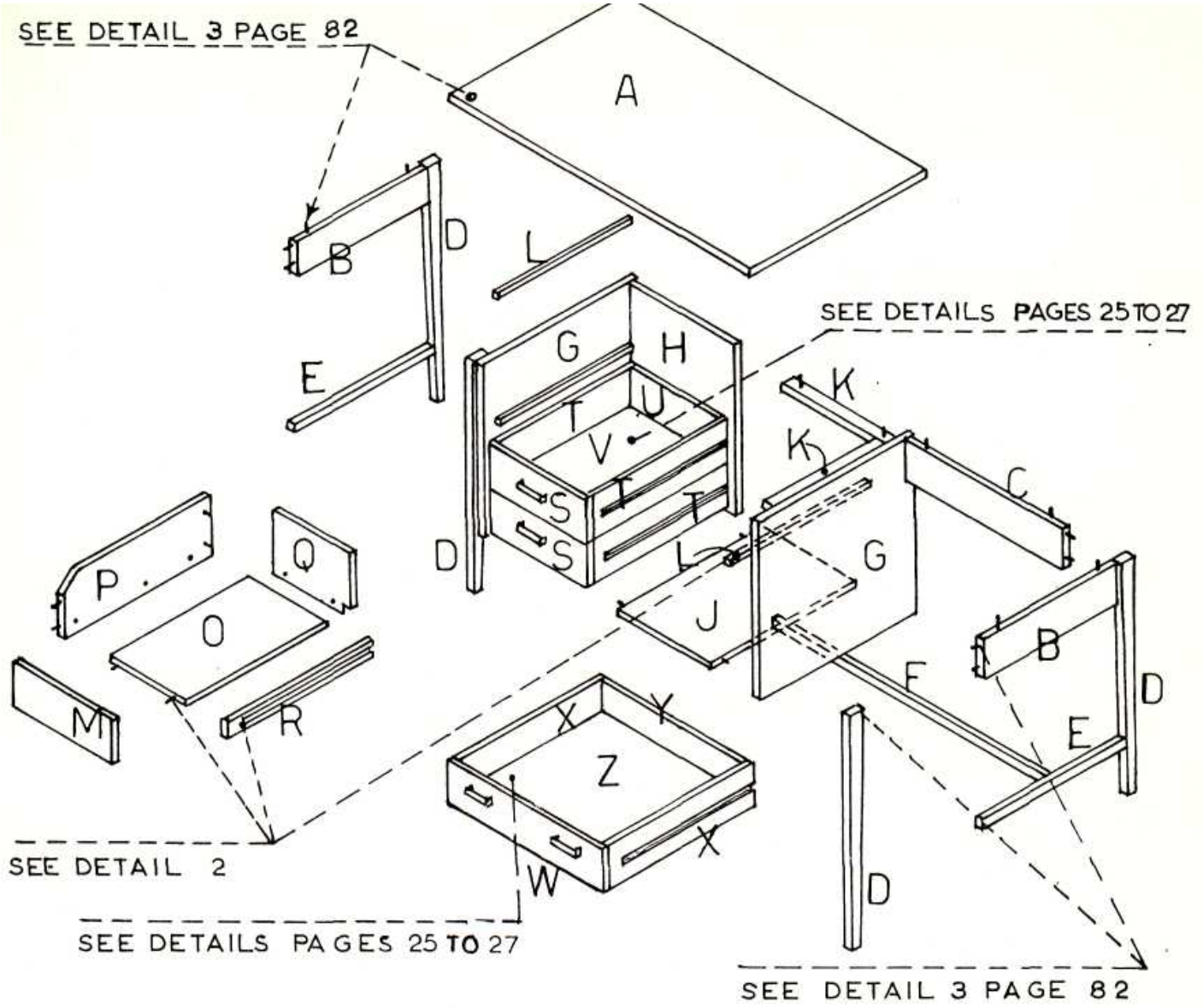
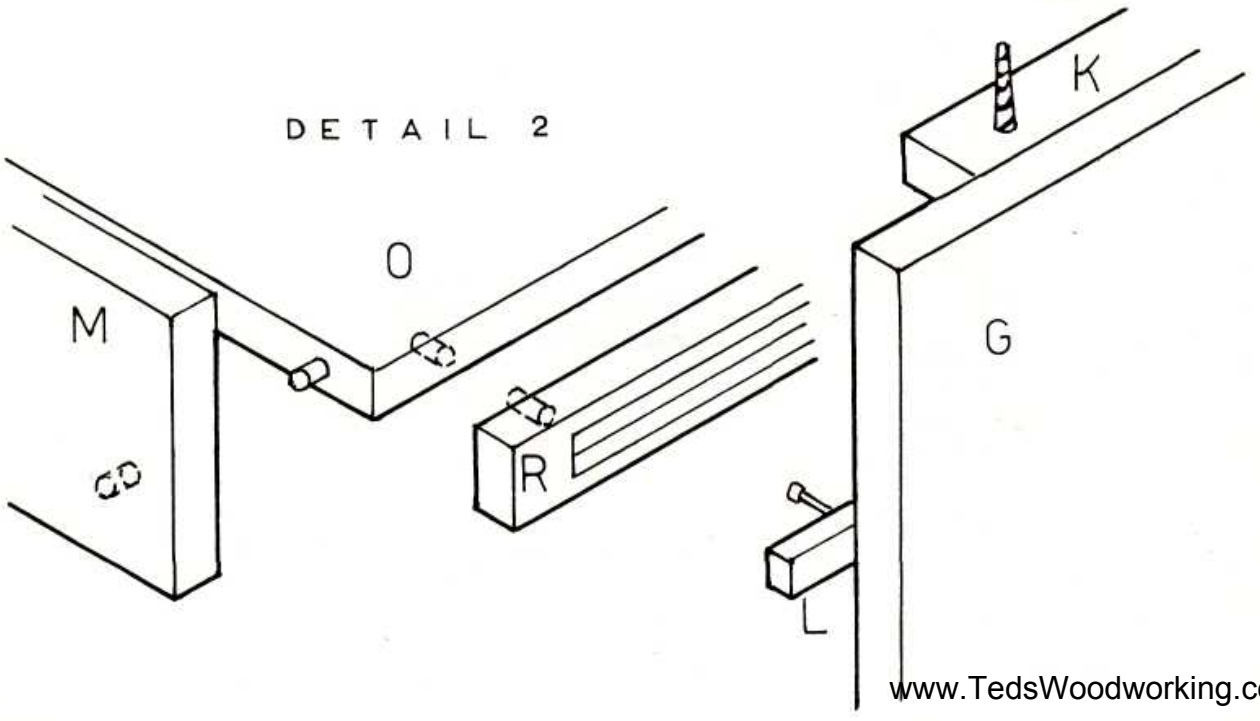


DETAIL 2



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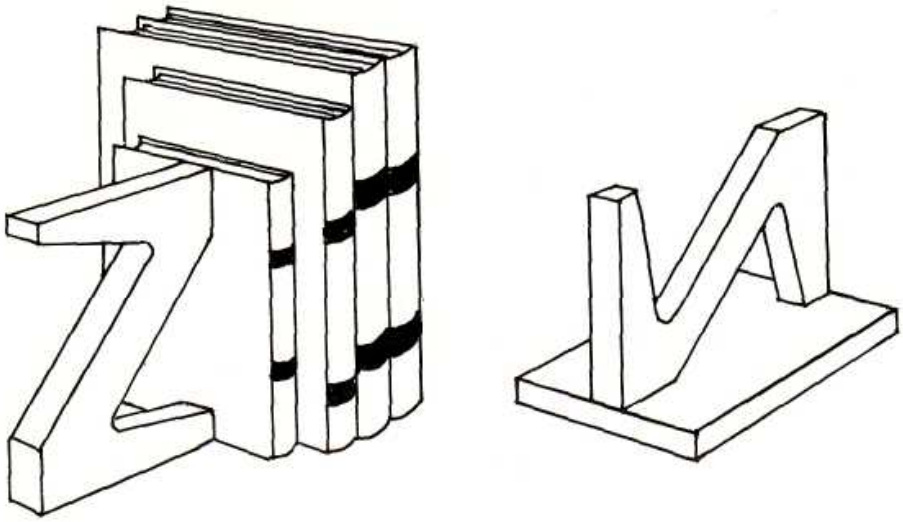
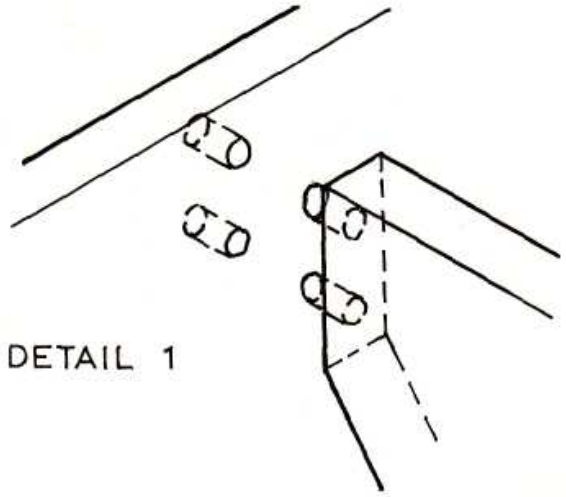
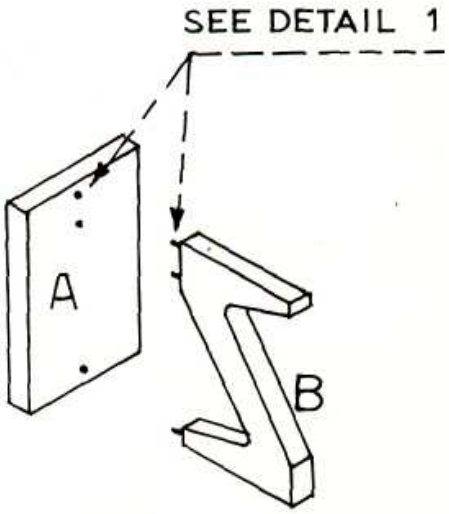
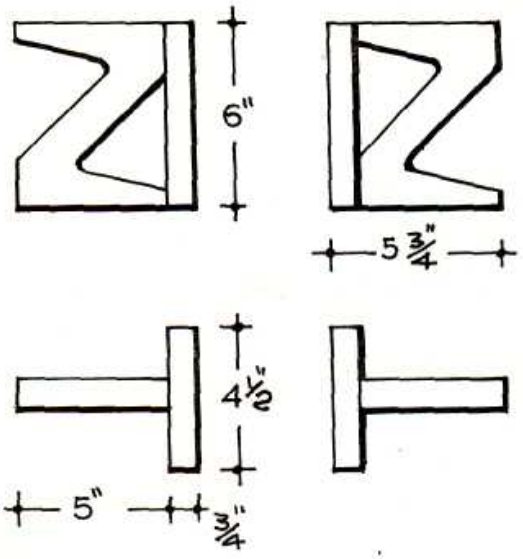
4.4 BOOKENDS

An interesting idea for book ends can be to fashion them in the form of your initials. Any combination of letters will do for this project.









List of Materials

A	2	boards	¾	4½	6
B	2	boards	¾	5	6

Instructions for Assembly

1. Join boards (A) with (B).
2. Apply finish.

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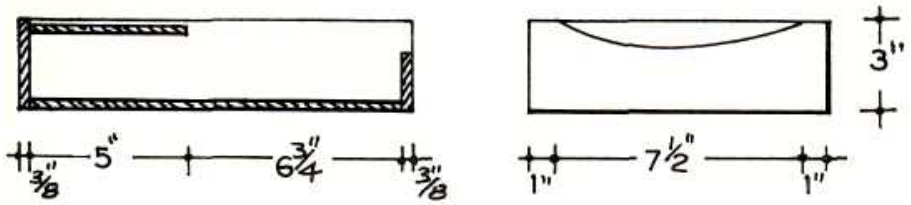
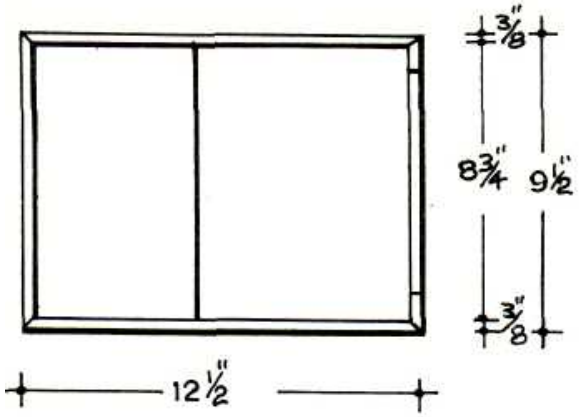
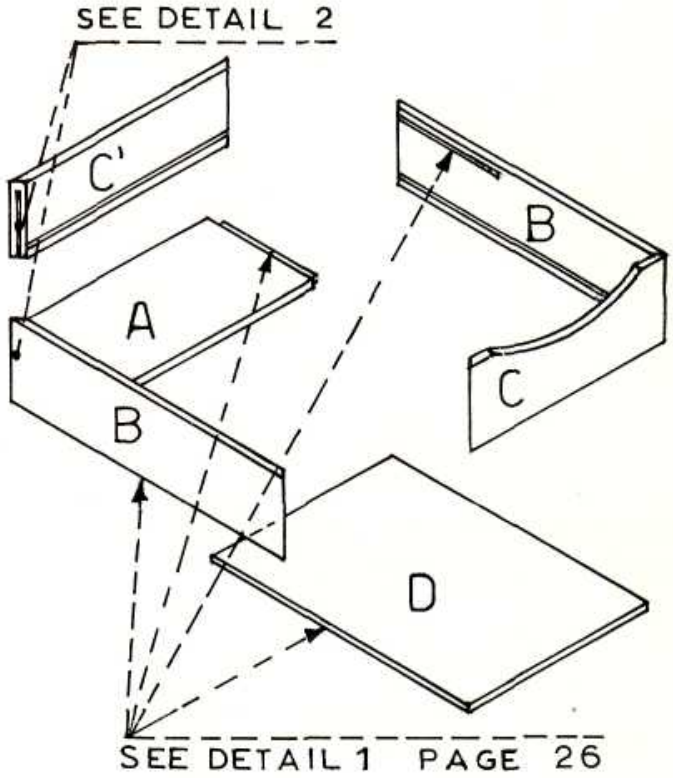
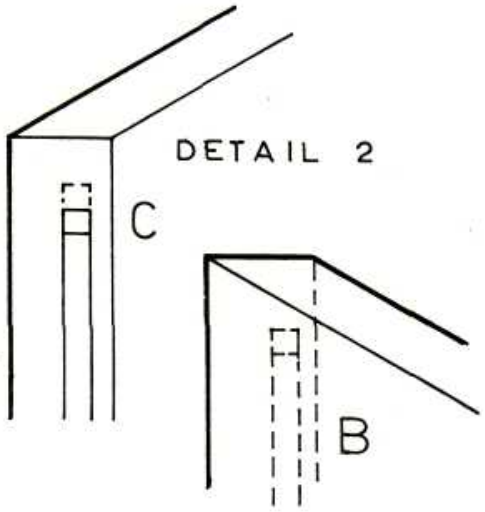
4.5 LETTER TRAY

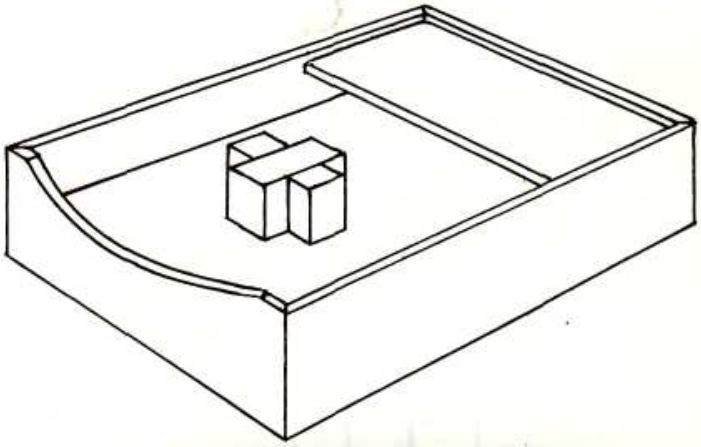
This rectangular-shaped letter tray is very simple to make, but careful construction will give a feeling of achievement.











List of Materials

A	1	top	3/8	5 1/8	9 1/8
B	2	sides	3/8	3	12 1/2
C,C'	2	front & back	3/8	3	9 1/2
D	1	bottom	3/8	9 1/8	12 1/8

Instructions for Assembly

1. Join top (A) and bottom (D) with front (C) and back (C') and sides (B).
2. Apply finish.

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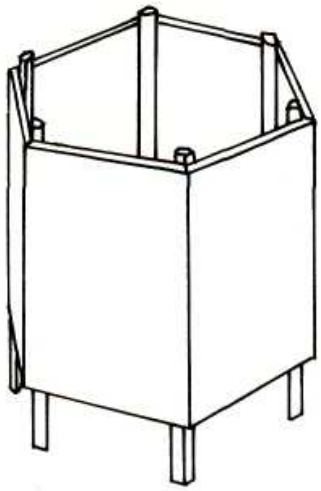
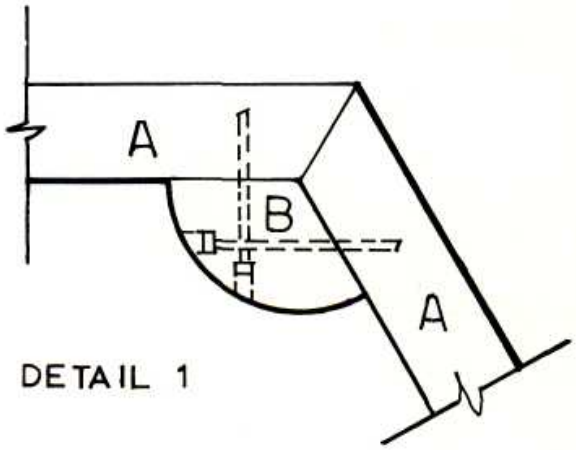
4.6 WASTEBASKET

One of the accessories to which designers very seldom give any attention is the humble wastebasket. The hexagonal type shown here will fit in with the furniture of any family room.





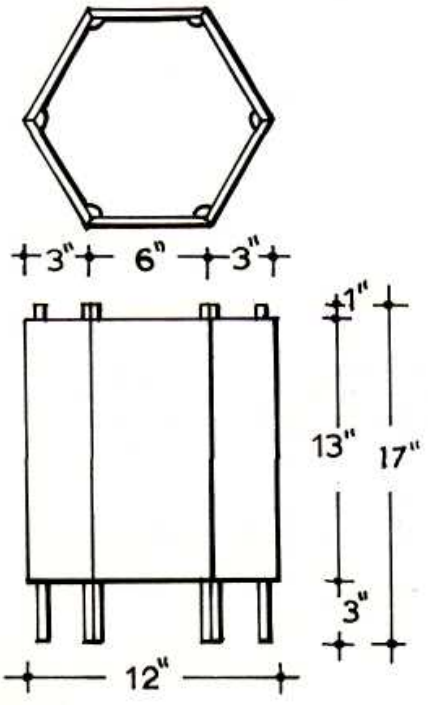
DETAIL 1

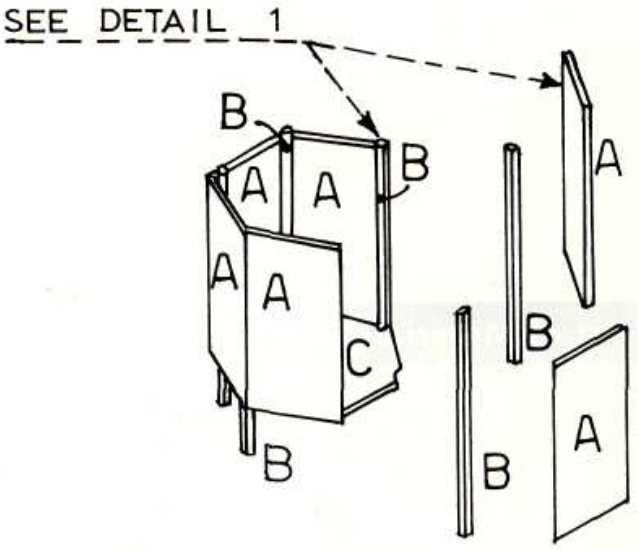
Instructions for Assembly

A	6	sides	⅝ diam.		14
B	6	supports	⅝	1	17
C	1	bottom	½	6	13

1. Join bottom (C) with supports (B) and sides (A).
2. Apply finish.

List of Materials





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4.7 MAGAZINE RACK

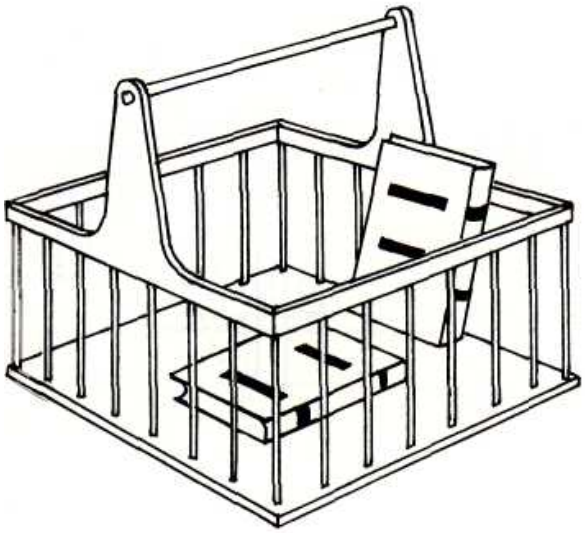
A magazine rack can be a very decorative addition in any home. Here is a good example that can be built easily and inexpensively.

List of Materials

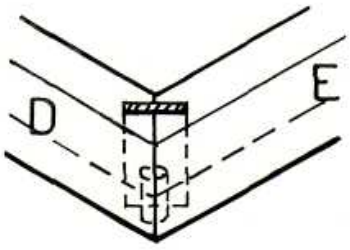
A	1	bottom	½	14	14
B	1	dowel	⅝ diam.		14
C	28	dowels	⅜ diam.		8½
D	2	sides	⅝	6½	14
E	2	sides	⅝	1	14

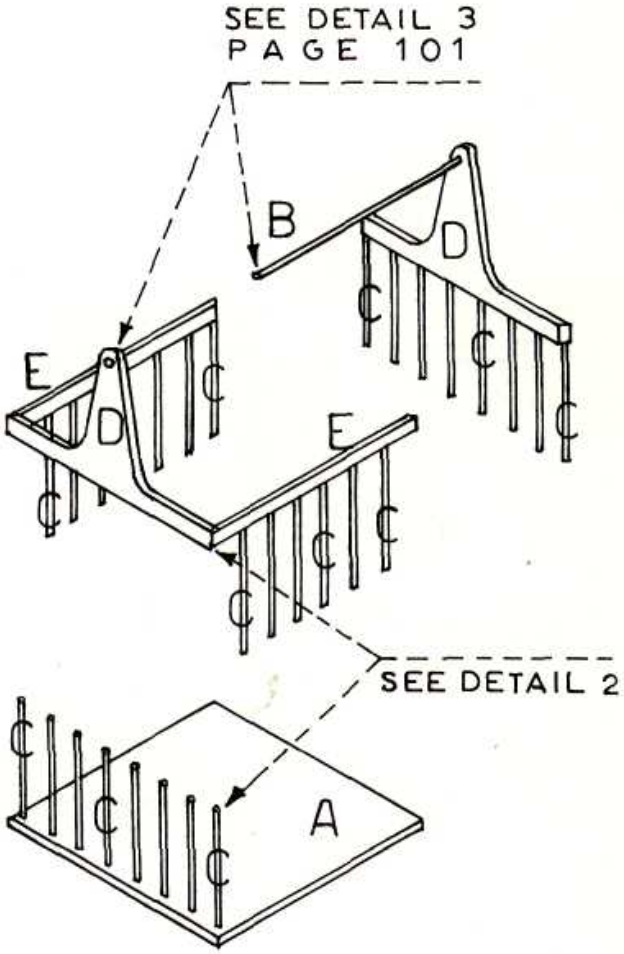
Instructions for Assembly

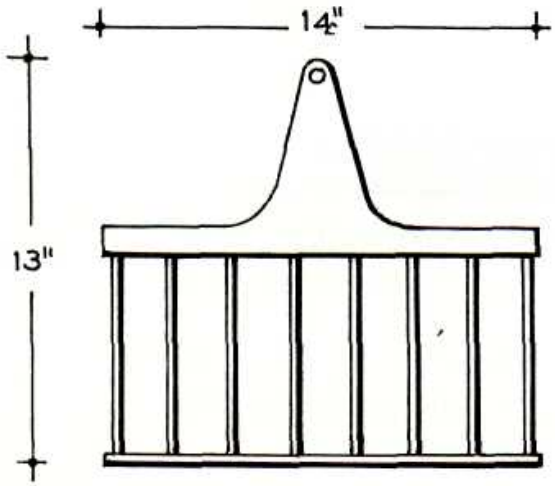
1. Join sides (D) with dowel (B) and sides (E).
2. Insert dowels (C) in bottom (A) and sides (D, E).
3. Apply finish.

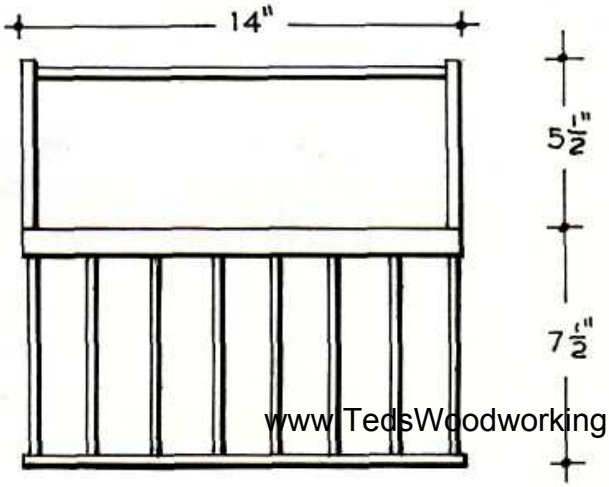


DETAIL 2









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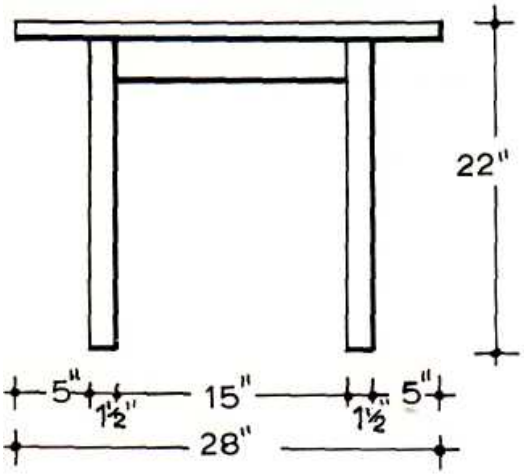
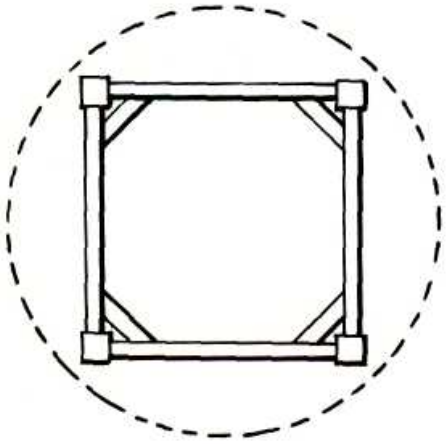
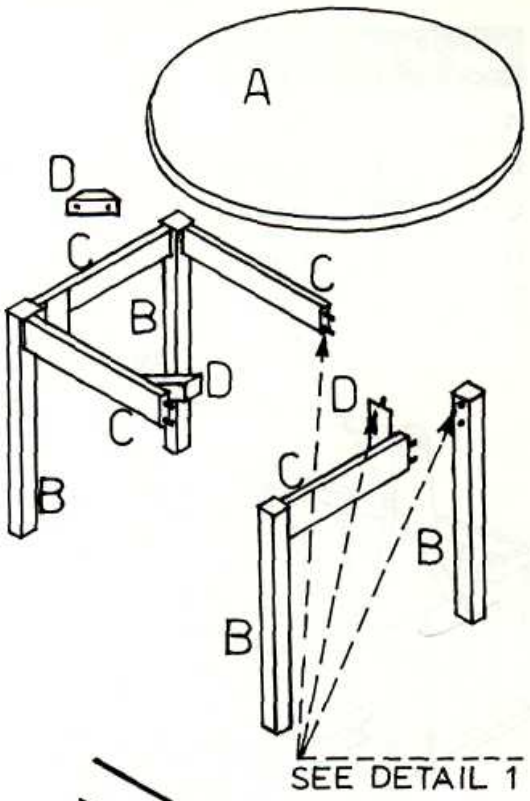
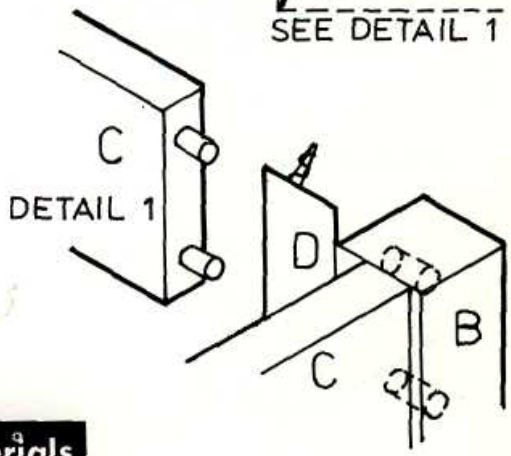
4.8 SMALL ROUND TABLE

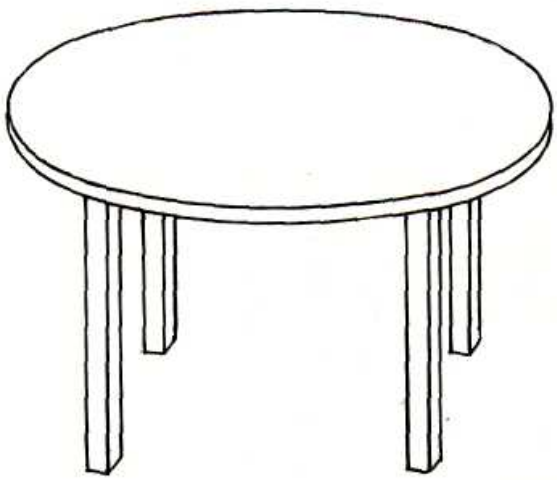
Ideal for cozy tea parties (simulated) and board games of the younger set. Can be combined with the plywood chair of page 97 to make a complete two-piece unit.











List of Materials

A	1	top	1	28 diam.	
B	4	legs	1½	1½	21
C	4	rails	1	2	15
D	4	corner blocks	1	2	4

Instructions for Assembly

1. Fasten legs (B) to rails (C).
2. Attach corner blocks (D) to rails (C).
3. Prepare round top and fasten with screws to corner blocks (D).
4. Apply finish.

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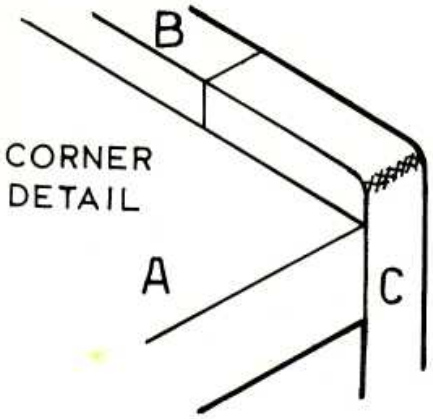
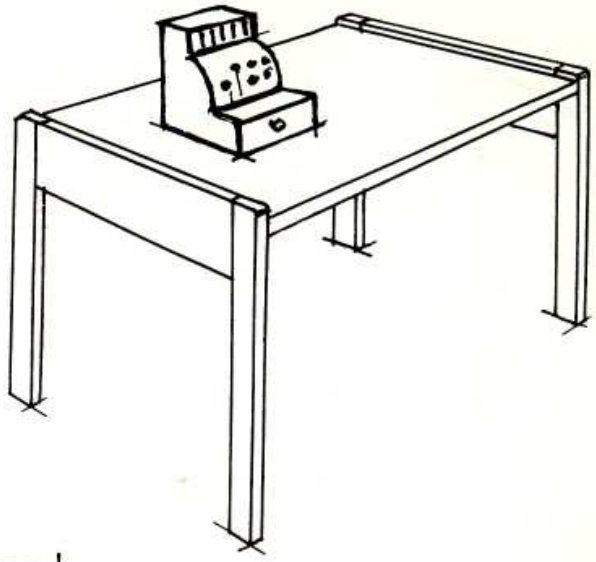
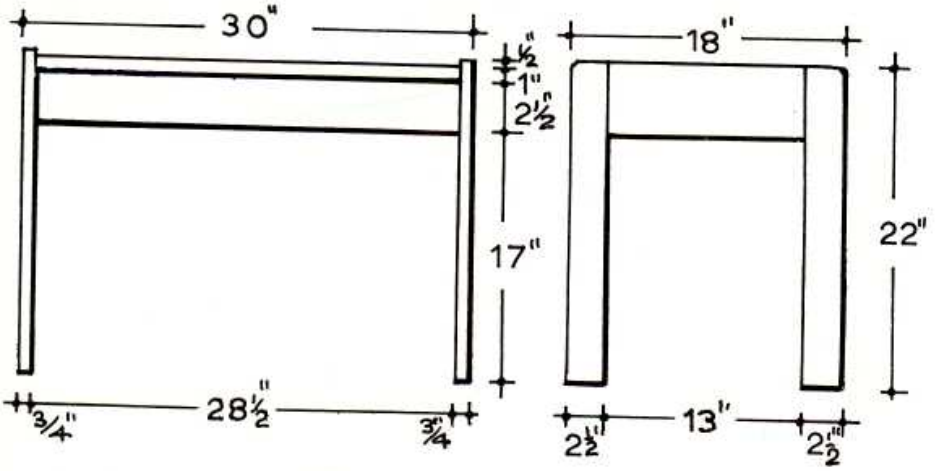
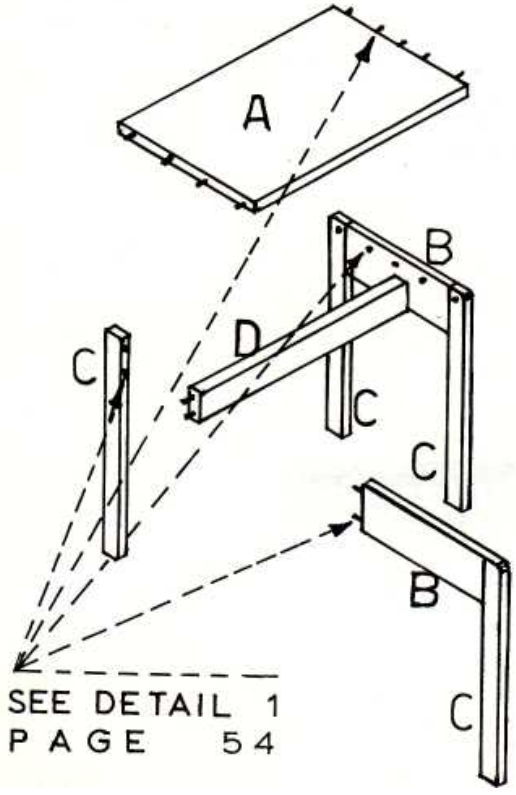
4.9 PLAY AND WORK TABLE

Because of its purpose, this table should have sturdy legs for steadiness and durability. Plywood top can be covered with plastic material, and a raised edge will keep pencils and crayons from falling on the floor.









List of Materials

A	1	top	¾	18	28½
B	2	traverse	¾	4	13
C	4	legs	¾	2½	22
D	1	rail	¾	2½	28½

Instructions for Assembly

1. Fasten traverse rails (B) to legs (C).
2. Join top (A) and cross rail (D) to traverse rails (B) and legs (C).
3. Apply finish.

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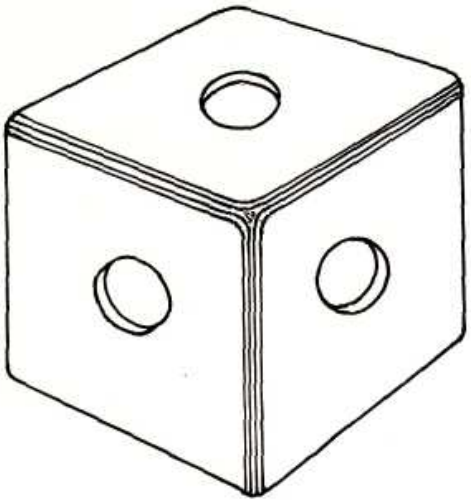
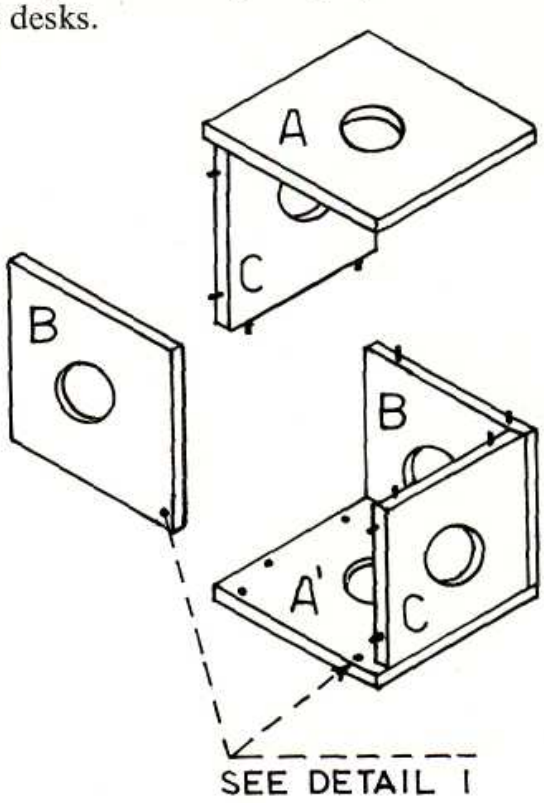
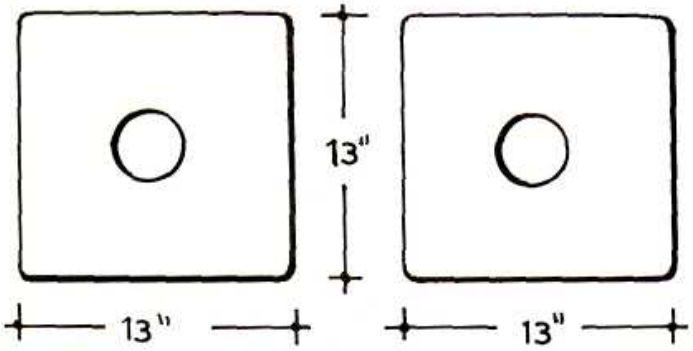
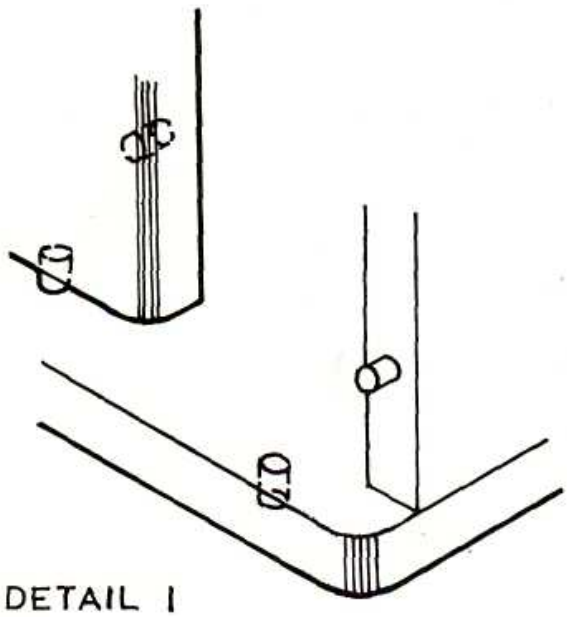
4.10 STOOL

Tip-proof and sturdy, this stool can serve equally well as a seat, a stand for gadgets such as radios and hamster cages, or occasionally as a night table. A good project to start on before undertaking more complicated items such as desks.









List of Materials

A	1	top	¾	13	13
A′	1	bottom	¾	13	13
B	2	sides	¾	11½	13
C	2	sides	¾	11½	11½

Instructions for Assembly

1. Join sides (B) with sides (C).
2. Fasten top (A) and bottom (A') to sides (B) and (C).
3. Apply finish.

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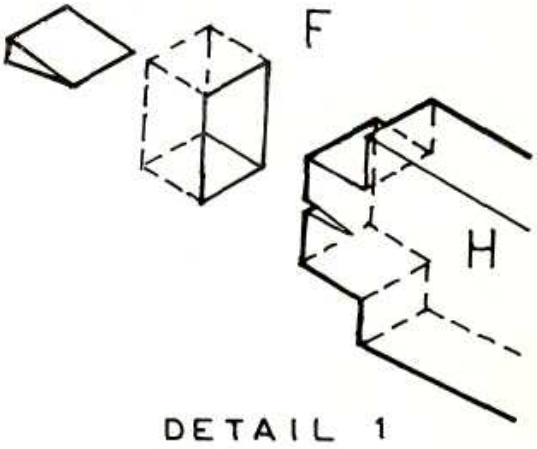
4.11 WORK TABLE

This is one of the most useful, all-purpose items for play, work and storage. The raised rim prevents small objects from falling off. Material used is plywood throughout, except for the cross-rail support, which is solid wood. A laminated plastic surface such as Formica is ideal for clay, finger paints, potted plants, aquariums, and even occasional between-meal snacks!



DETAIL 1

List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length		
A	1	top	½	14½	19
B	1	bottom	½	13½	19
C	2	sides	½	3½	14½
D	1	front	½	3½	20
E	1	back	½	2¾	19
F	1	support	¾	13	19½
G	1	support	¾	9	13½
H	1	rail	1¼	3	24
J	1	seat	¾	8	12
K	1	brace	1½	1½	11

Instructions for Assembly

1. Attach sides (C) to front (D) and back (E) and to bottom (B).
2. Install top (A) on front (D).
3. Join rails (H) to supports (F) and (G).
4. Fasten seat (J) to rails (H) and supports (G).
5. Join brace (K) to support (F) and fasten to bottom (B).
6. Apply finish.

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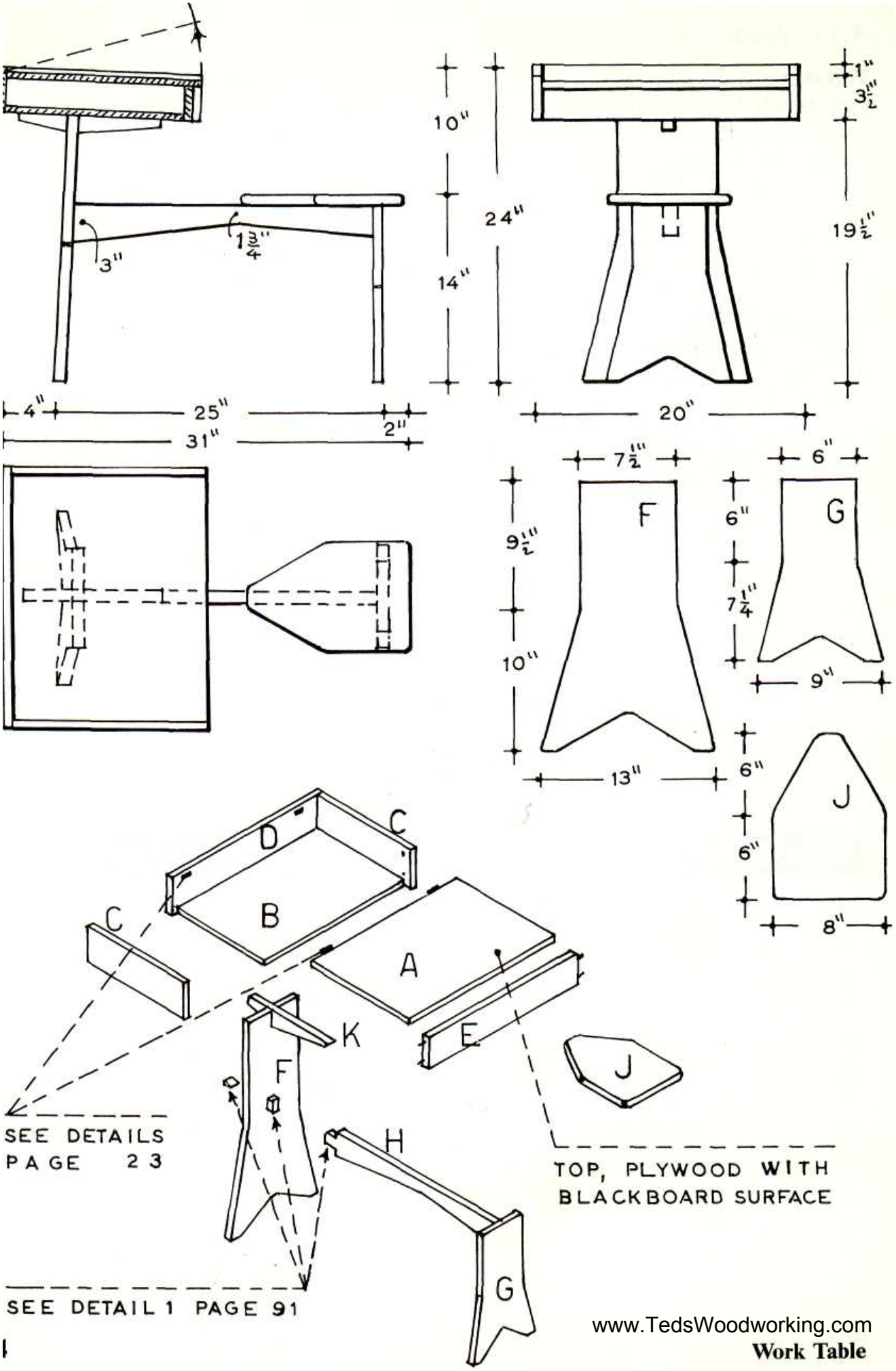

10"
24"
14"
1"
3½"
19½"
3"
1¾"
4"
25"
2"
31"
20"
7½"
6"
F
G
9½"
10"
6"
7¼"
9"
13"
J
6"
6"
8"
C
D
B
A
K
E
F
H
G
SEE DETAILS PAGE 23
SEE DETAIL 1 PAGE 91
TOP, PLYWOOD WITH BLACKBOARD SURFACE

4.12 STANDARD CHAIR

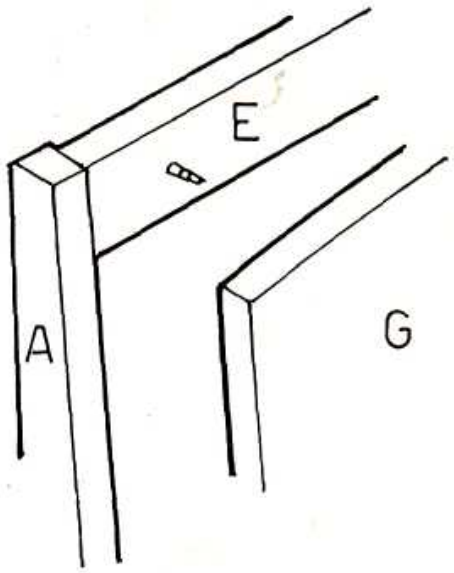
Why build a "standard" chair when they can be bought so easily? Answer: it's more fun. Then, too, you can "tailor" it to match the other furniture in your child's room. Besides, think of the heirloom value!

List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length		
A	2	legs	1	3	31
B	2	legs	1	1¾	16¾
C	2	rails	¾	1¾	13½
D	2	rails	¾	1¾	13
E	1	rail	¾	1¼	13
F	1	seat	¾	17	18
G	1	back	½	6	16
H	2	stretchers	⅝ diam.		14
J	2	stretchers	⅝ diam.		16
K	4	corner blocks	1	2	2

Instructions for Assembly

1. Attach legs (A) and (B) to rails (C) and stretcher (J).
2. Join legs (A) and (B) to rails (E) and (D) and to stretchers (H).
3. Fasten corner blocks (K) and attach seat (F) with screws.
4. Fasten back (G) to rail (E) and legs (A) with screws.
5. Apply finish. *Note:* Seat can be upholstered with half-inch foam rubber, covered with either fabric or plastic.



DETAIL 1

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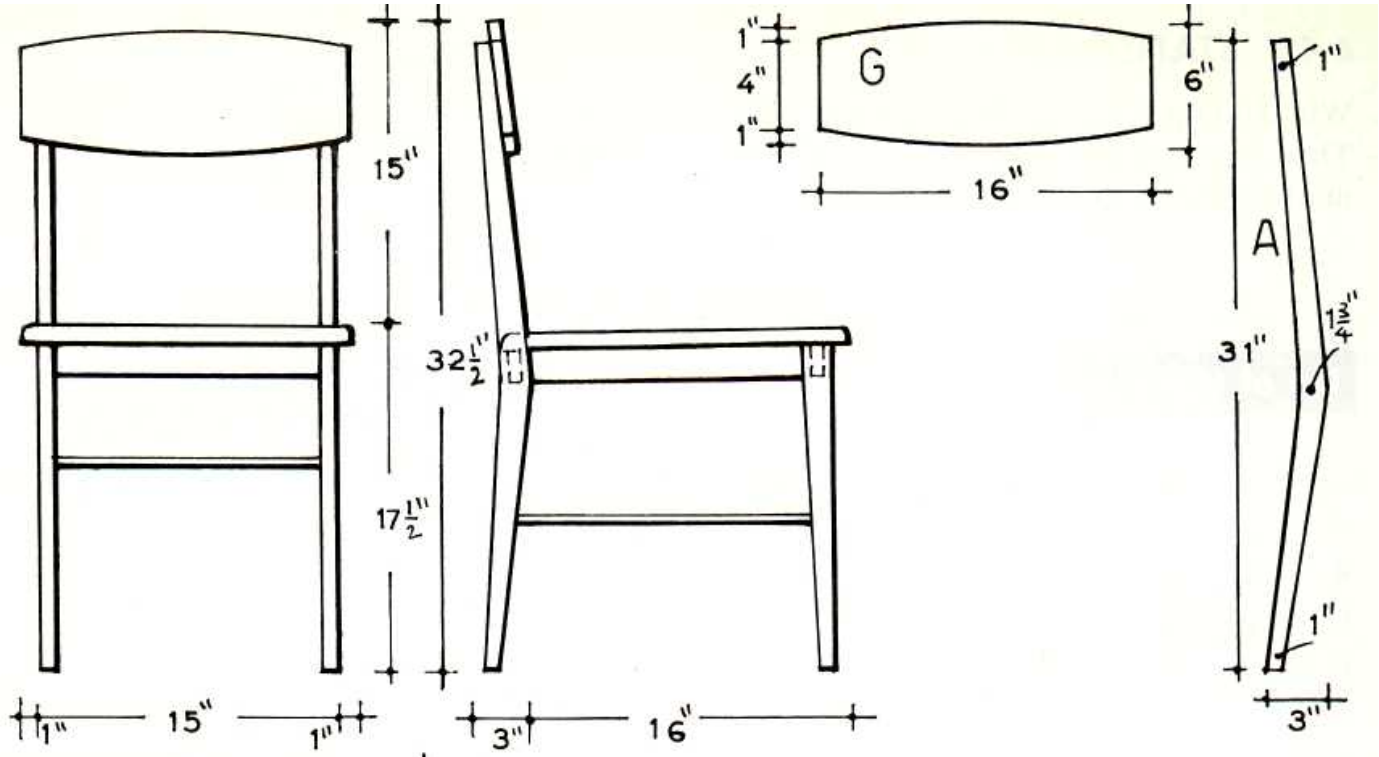
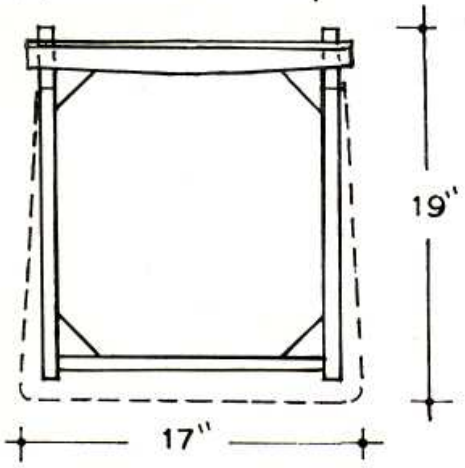
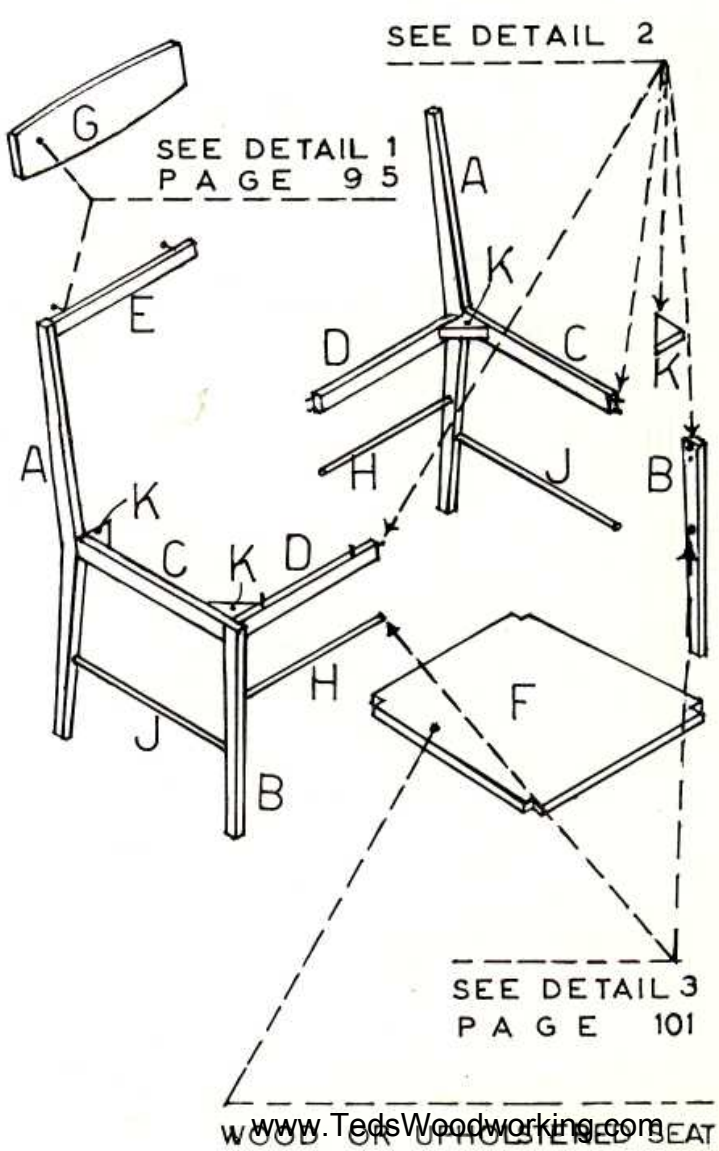
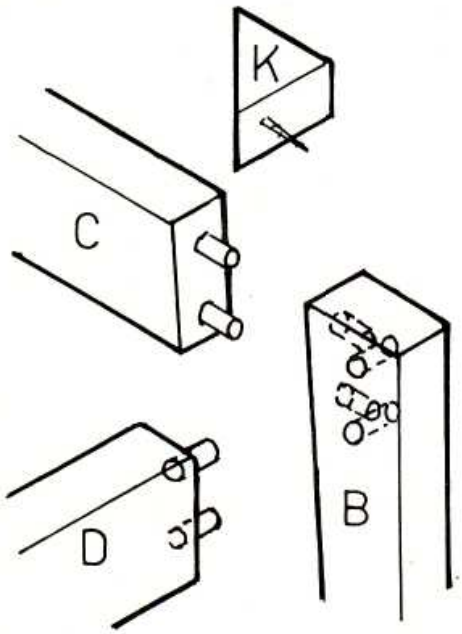






DETAIL 2



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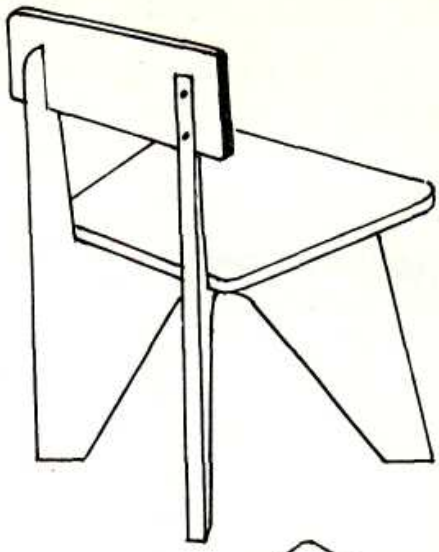
4.13 PLYWOOD CHAIR

Simple in construction and designed for hard use, this practical chair has the shortest list of materials in the book. Makes an attractive companionpiece to the table of Project 4.9.

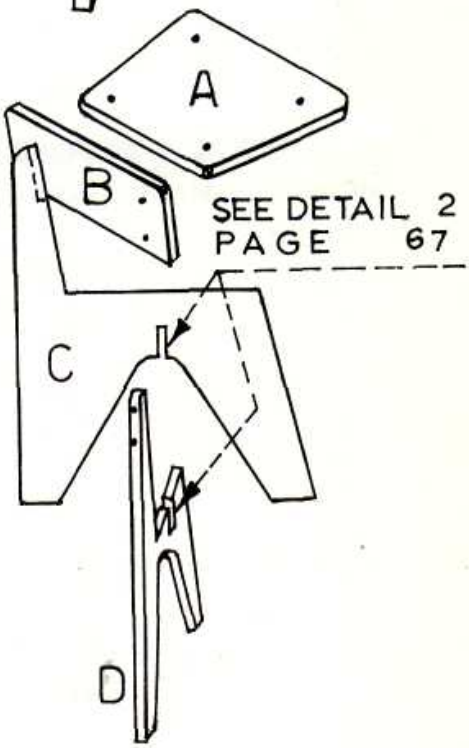


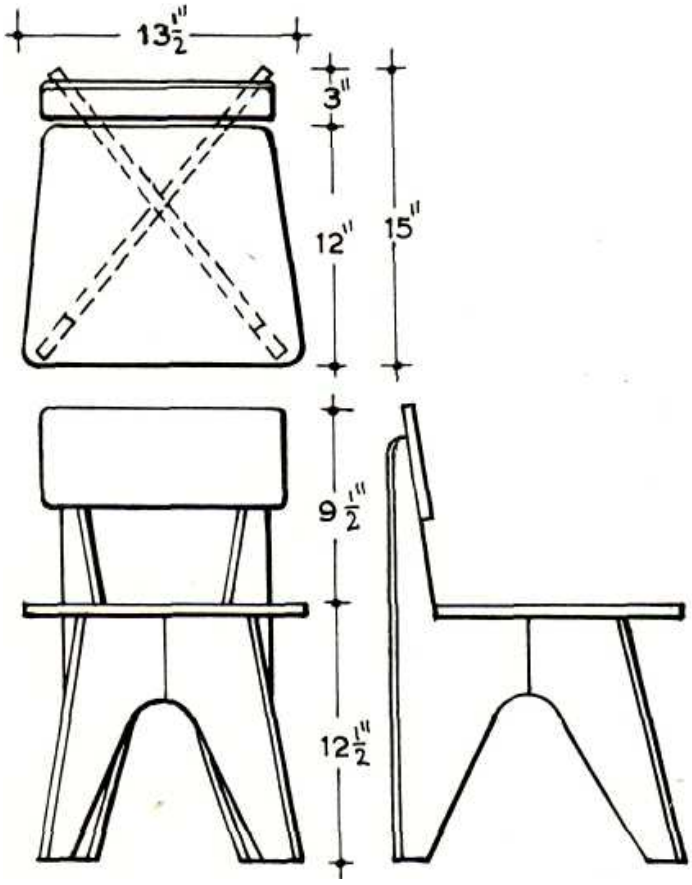
List of Materials

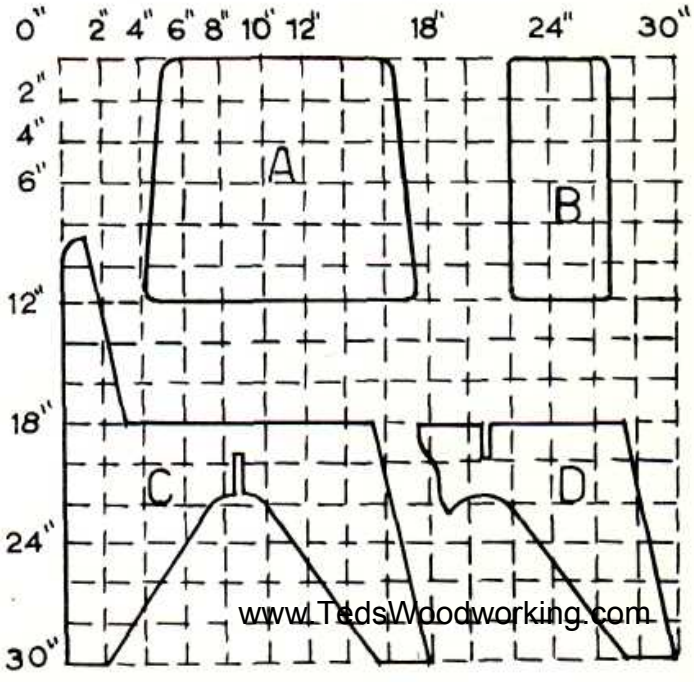
PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length		
A	1	plywood panel (finished both sides)	½	30	30

Instructions for Assembly

1. Enlarge drawing of parts to full scale and trace on plywood as indicated. Do not buy plywood with "rough finish" (knots in veneer) on one side; both sides must be "smooth finish."
2. Join together cross supports (C) and (D).
3. Attach seat (A) to cross supports (C) and (D) with screws.
4. Fasten back (B) to cross supports (C) and (D).
5. Apply finish.







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4.14 STEP STOOL

Secondary but eminently useful—for climbing, reaching, sitting, and as a footrest in the bathroom. Easy and inexpensive to make.

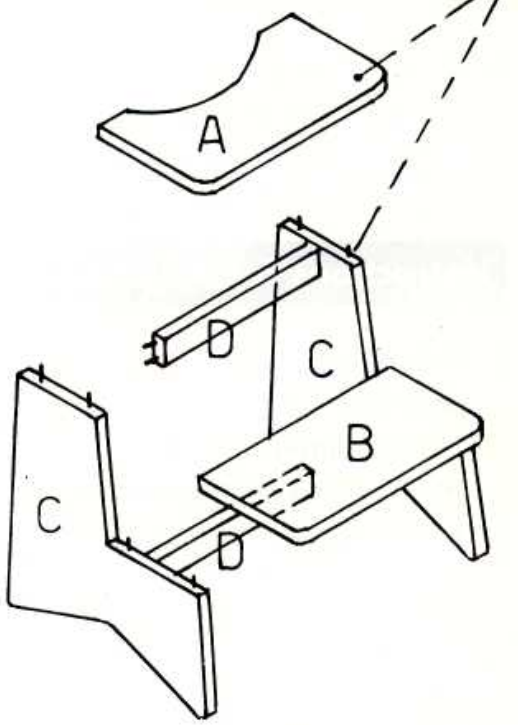
List of Materials

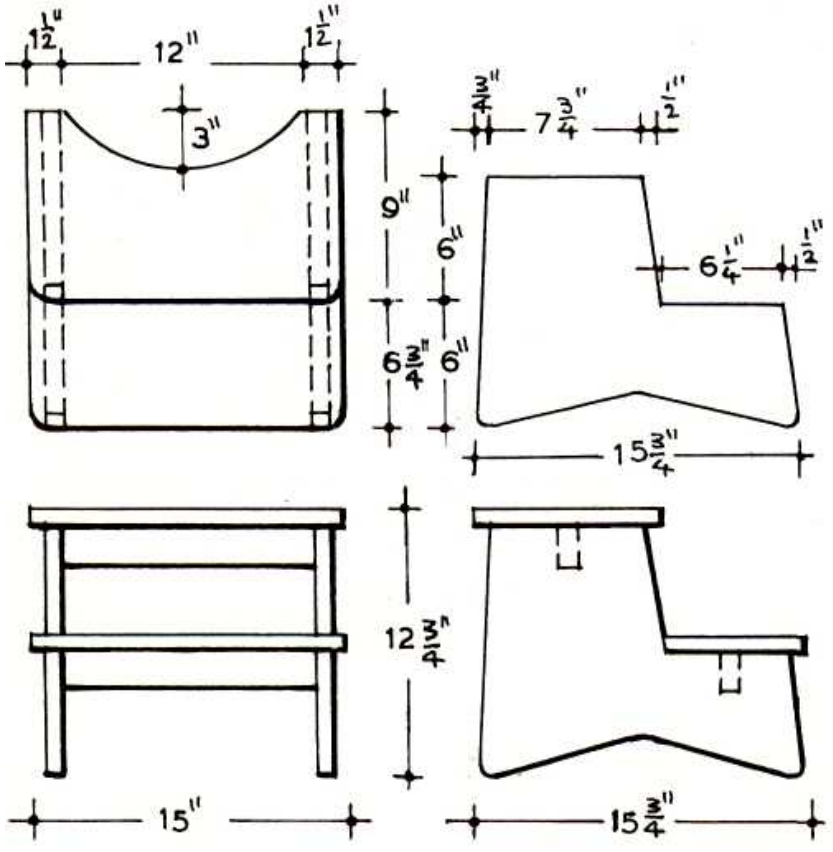
PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length		
A	1	step	¾	9	15
B	1	step	¾	6¾	15
C	2	sides	¾	12	15¾
D	2	rails	1	2	12

Instructions for Assembly

1. Join sides (C) with rails (D).
2. Fasten steps (A) and (B) to sides (C) and rails (D).
3. Apply finish.

SEE DETAIL 1 PAGE 123





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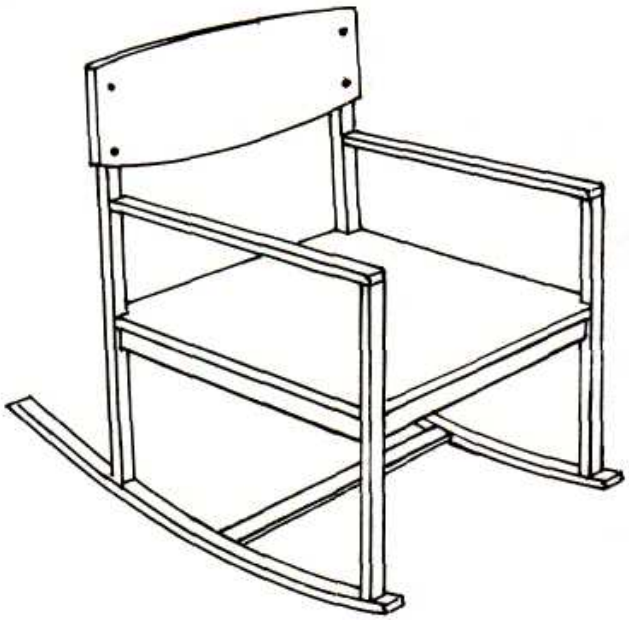
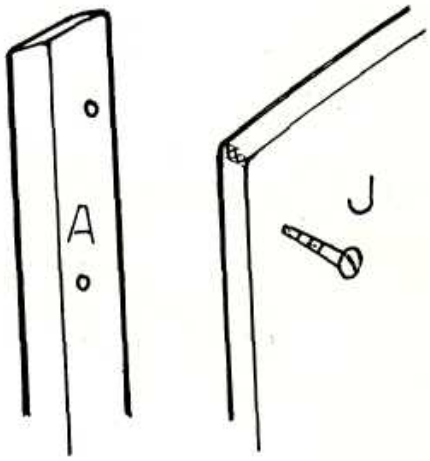
4.15 ROCKING CHAIR

Children love to "cruise" in a rocking chair, and it's good exercise. This simple design with solid wood frame and plywood seat and back is just right size, too.





DETAIL 2

List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length		
A	2	legs	1	1½	22
B	2	legs	1	1½	15
C	2	arms	1	1½	17½
D	2	bases	2½	1½	25
E	1	rail	½	1½	14
F	2	rails	¾	1½	14
G	2	rails	¾	1½	16
H	1	seat	½	17	18
J	1	back	½	6	17½

Instructions for Assembly

1. Attach arms (C), rails (G) and bases (D) to legs (A) and (B).
2. Join rails (E) and (F) to legs (A) and (B) and to base (D).
3. Attach seat (H) to rails (F) and (G) with screws.
4. Fasten back (J) to legs (A).
5. Apply finish.

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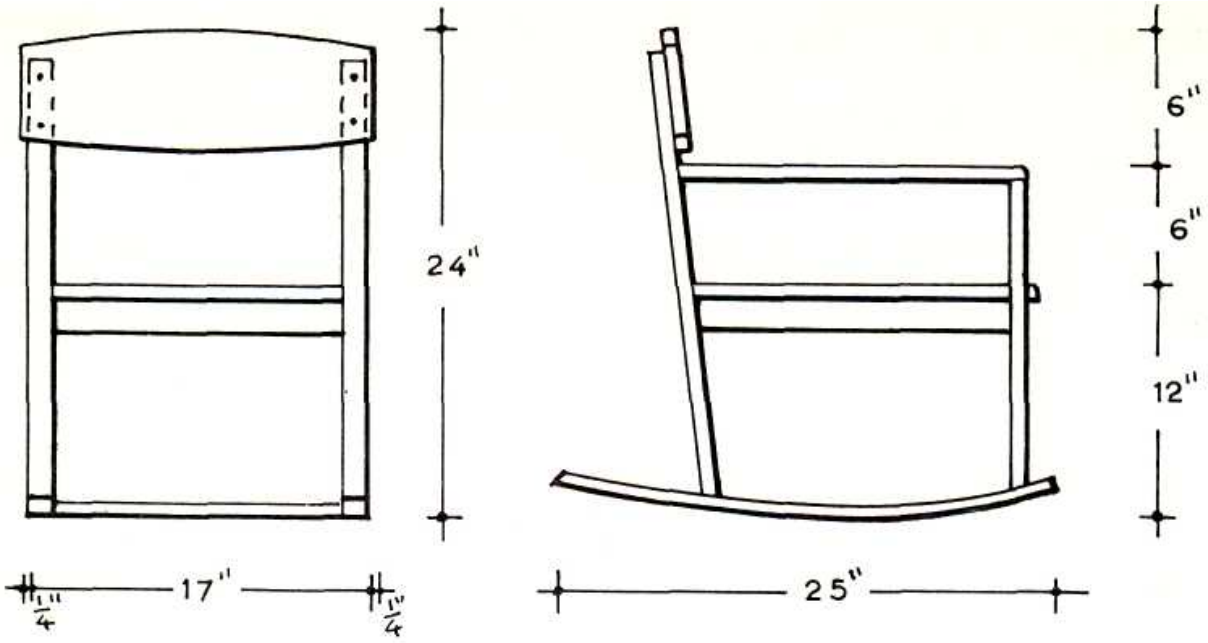

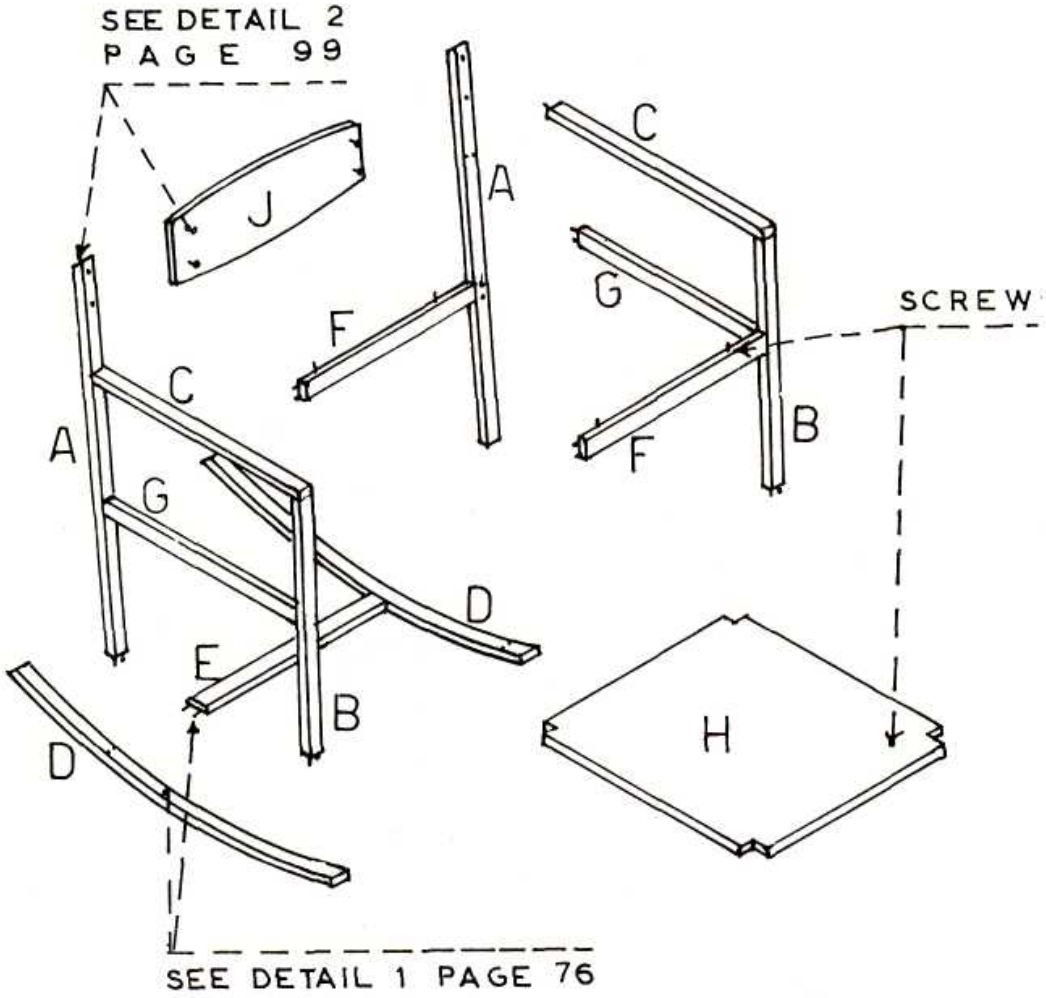

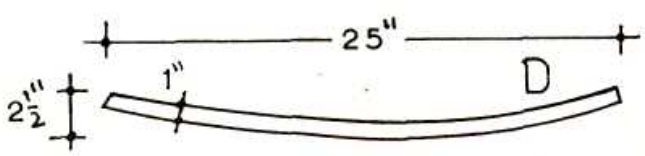

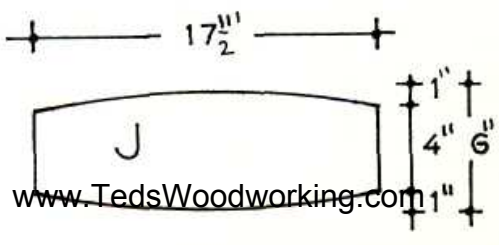

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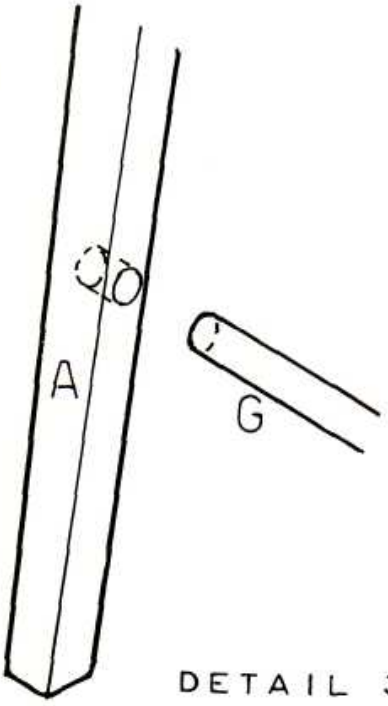
4.16 JUNIOR CHAIR OR HIGH STOOL

More grown-up and dignified than the high chair of Project 1.4, this easy-to-make item allows junior to eat right off the dining-room table. The foot rest is strictly for comfort.



DETAIL 3

List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length		
A	2	legs	1	2½	36
B	2	legs	1	1¾	27¾
C	2	arms	1	1¼	15
D	1	back	½	7	14
E	1	seat	¾	16	16
F	2	rails	¾	1¾	14
G	4	stretchers	⅝ diam.		17
H	2	stretchers	⅝		15
J	2	supports	½	4	5
K	1	support	½	5	13

Instructions for Assembly

1. Attach legs (A) and (B) to arms (C) and stretchers (G).
2. Join legs (A) and (B) to back (D) and rails (F) and stretchers (H).
3. Fasten seat (E) to rails (F) with screws.
4. Join supports (J) and (K) together and fasten to legs (B) with screws.
5. Apply finish.

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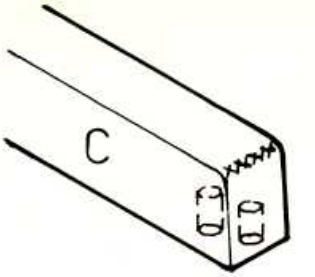
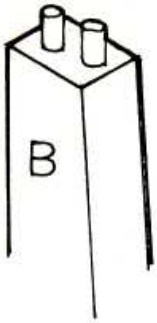
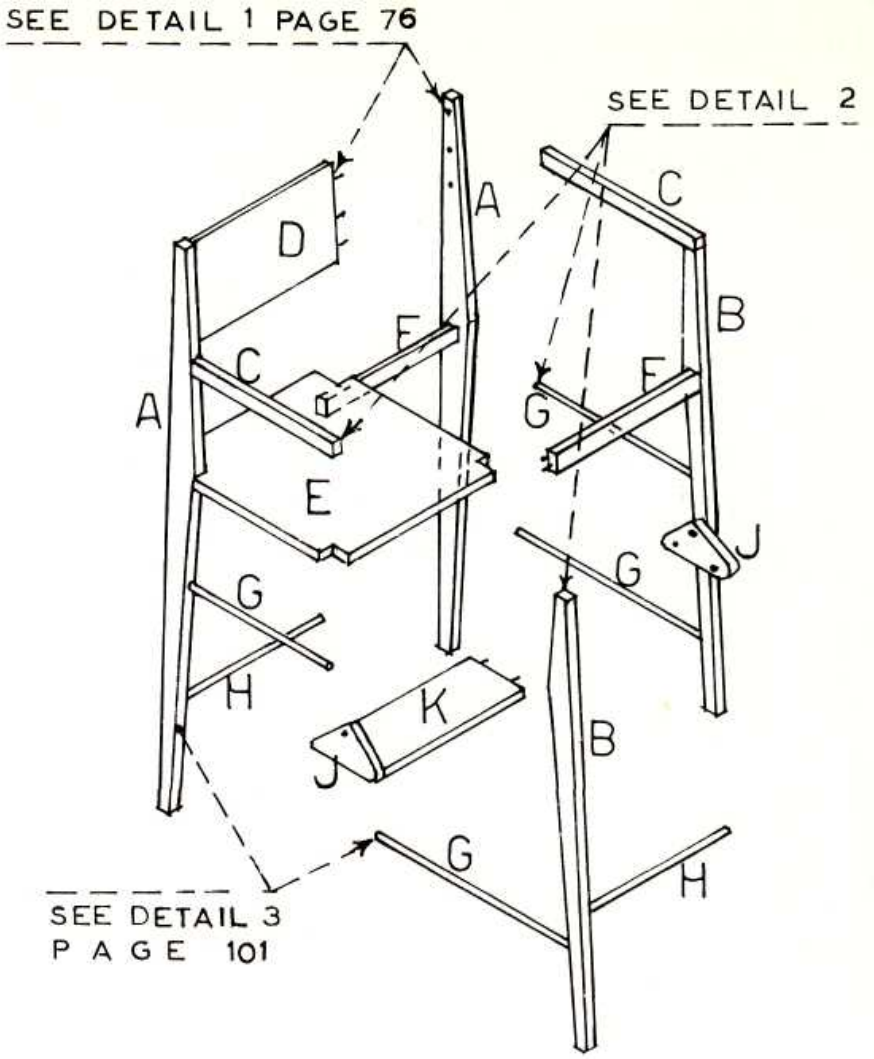
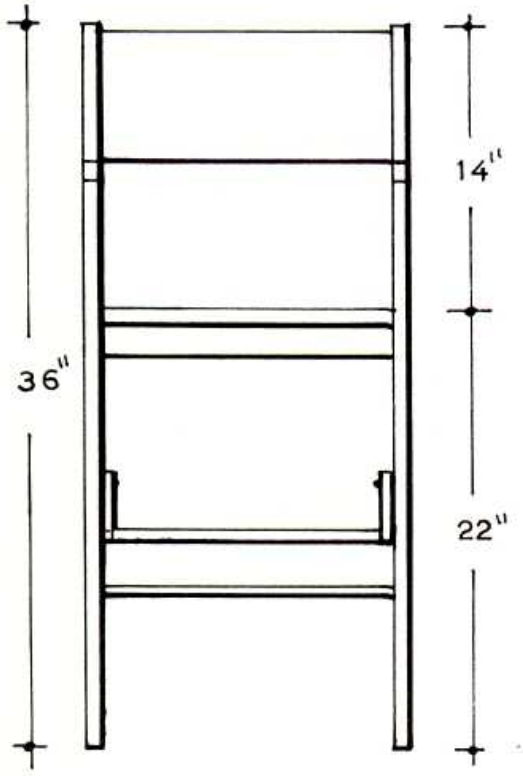
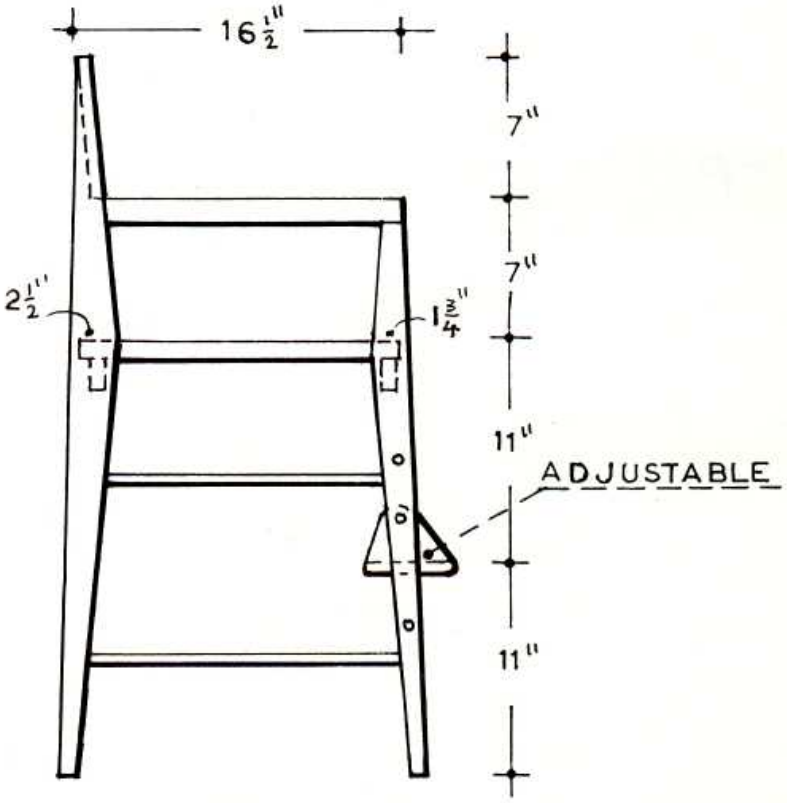




DETAIL 2







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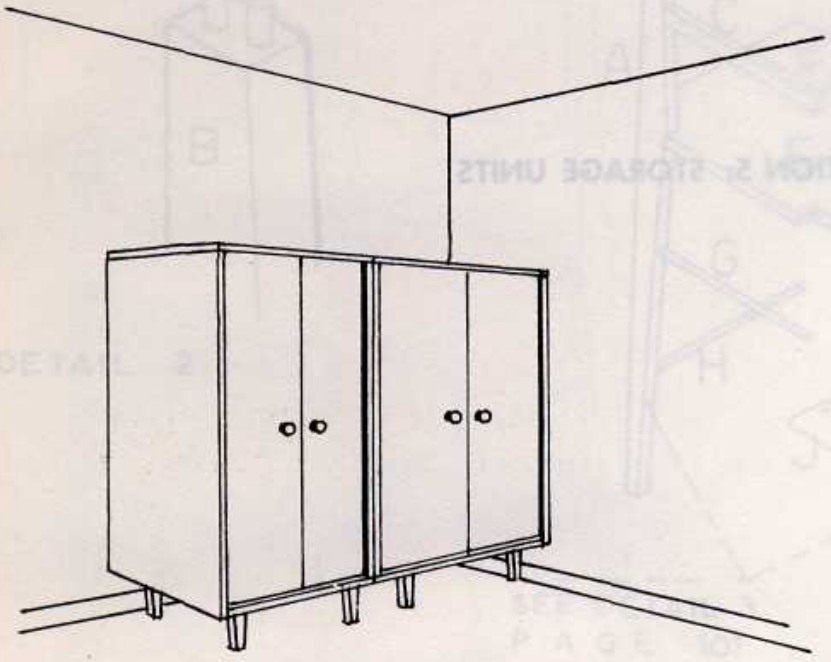
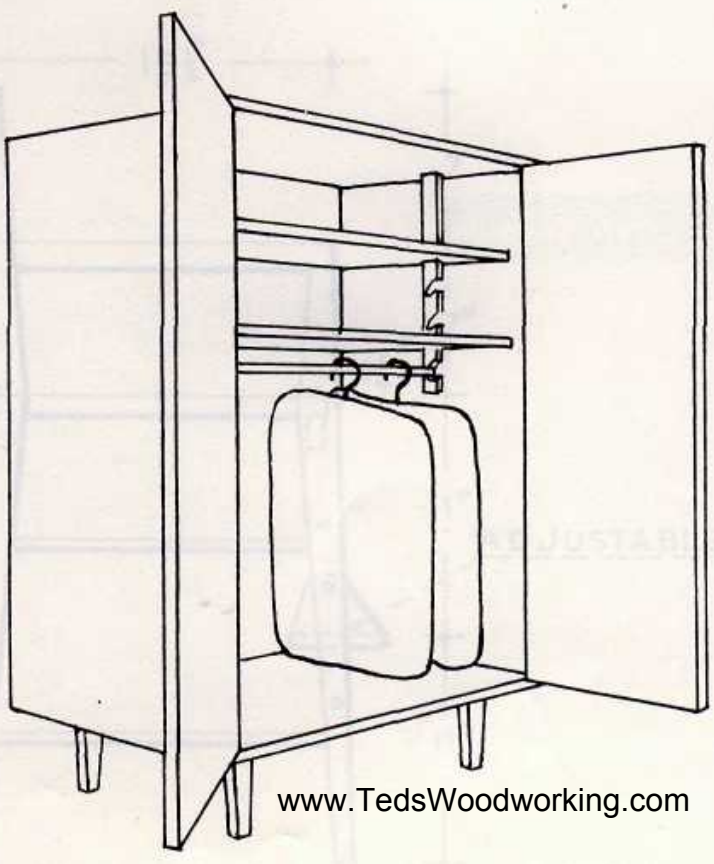
5.1 WARDROBE

Here's a piece of furniture that grows with the child! Both shelves and clothespole may be raised as the little man (or lady) gets taller. Standing a full six feet from the floor, the wardrobe can even be used by adults if one shelf is removed.





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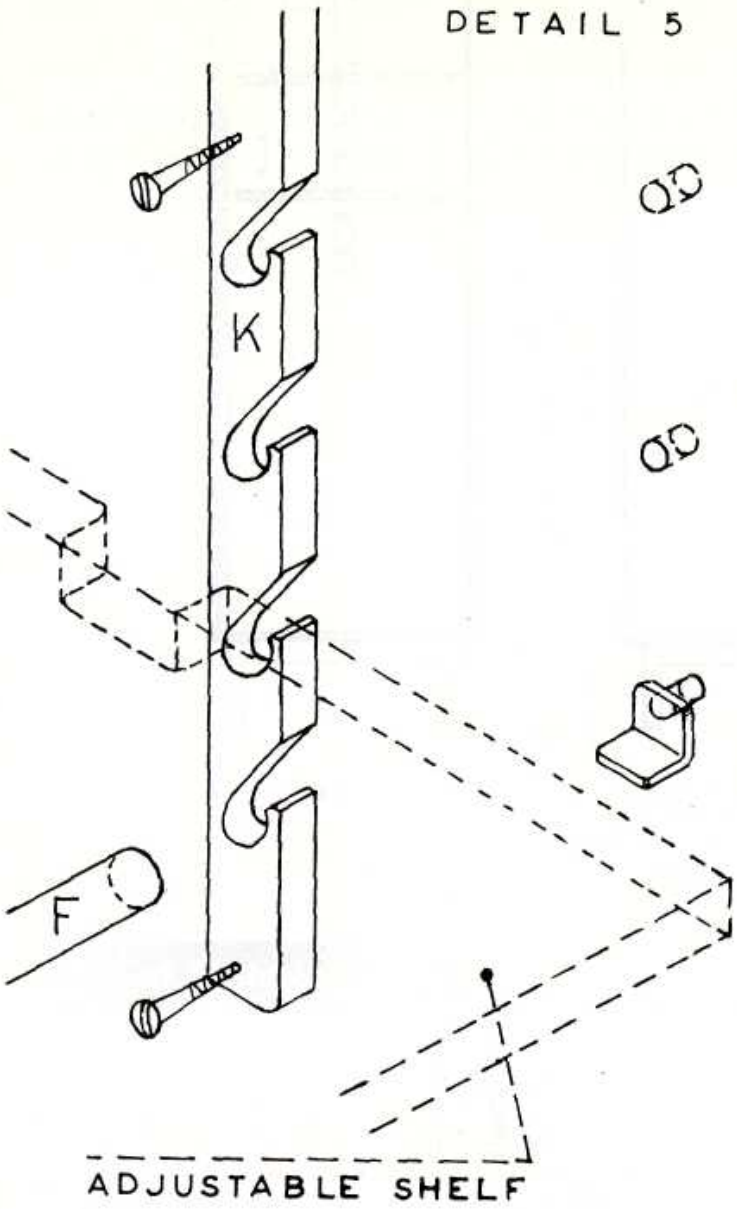

Instructions for Assembly

1. Join top and bottom (A) with sides (B).
2. Install back (C).
3. Fasten strips (K).
4. Join rails (H) and (J) to legs (G) and attach base to bottom (A) with screws.
5. Attach doors (D) to sides (B) and install pipe (F) and shelf (E).
6. Apply finish.

List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness	×	width	×	length
A	2	pieces	¾		24		34½
B	2	sides	¾		24		64
C	1	back	¼		35½		63½
D	2	doors	¾		17¼		62½
E	2	shelves	¾		22		34½
F	1	pipe	1 diam.				34½
G	4	legs	1		1¾		8
H	2	rails	1		1¾		19
J	1	rail	1		1¾		25½
K	2	strips	½		2		30

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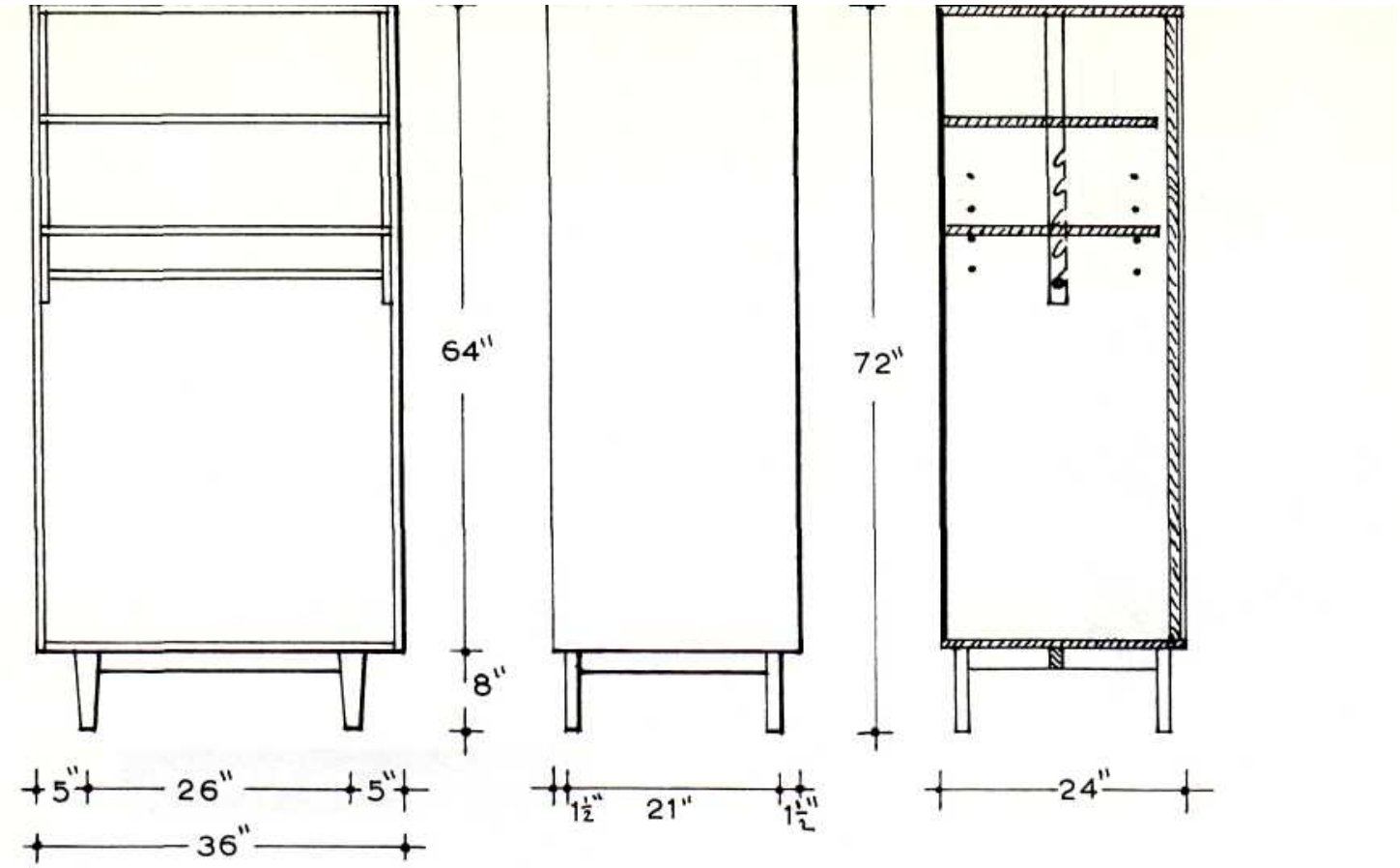

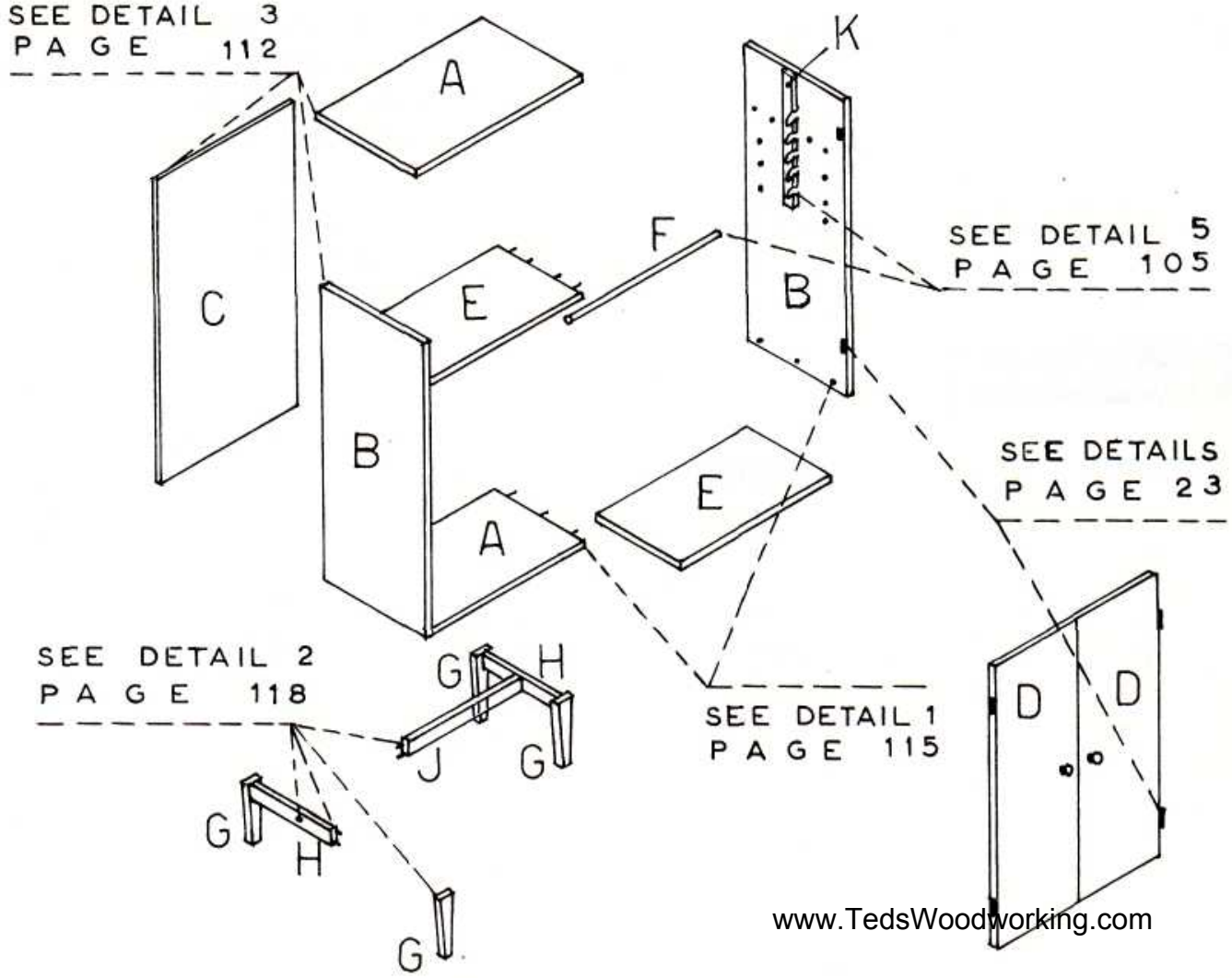

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5.2 LOW CHEST

Made of plywood with solid wood base, this is attractive and serviceable—and will stand a lot of rough usage from busy teen-agers, which might not be true of an expensive store-bought piece. The addition of a wall mirror converts it into a dresser.

List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness	×	width	×	length
A	1	top	¾		17		36
B	1	bottom	¾		17		34½
C	2	sides	¾		17		21¼
D	1	back	¼		21½		35½
E	1	partition	¾		9½		16¾
F	2	rails	¾		2		16⅞
G	2	rails	¾		2		34½
H	10	cleats	¾		1		14¾
J	4	drawer fronts	¾		4		16⅞
K	8	drawer sides	½		4		16⅜
L	4	drawer backs	½		3½		15⅞
M	4	drawer bottoms	¼		16⅜		16¼
N	4	drawer sides	½		5⅛		16⅜
O	2	drawer fronts	¾		5⅛		34½
P	2	drawer backs	½		4⅝		33½
Q	2	drawer bottoms	¼		34		16¼
R	4	legs	1½		1½		8
S	2	rails	¾		1½		27
T	2	rails	¾		1½		12½

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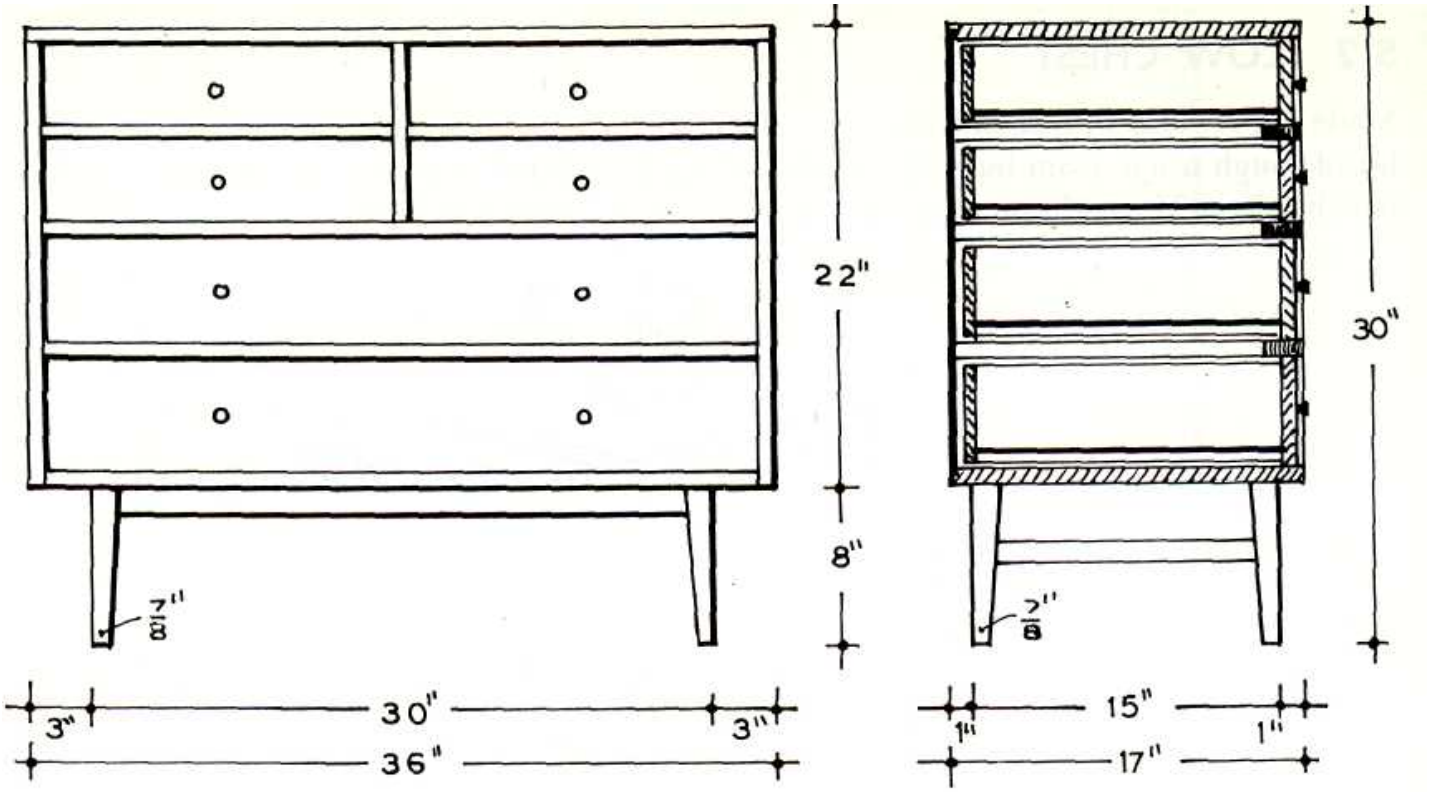

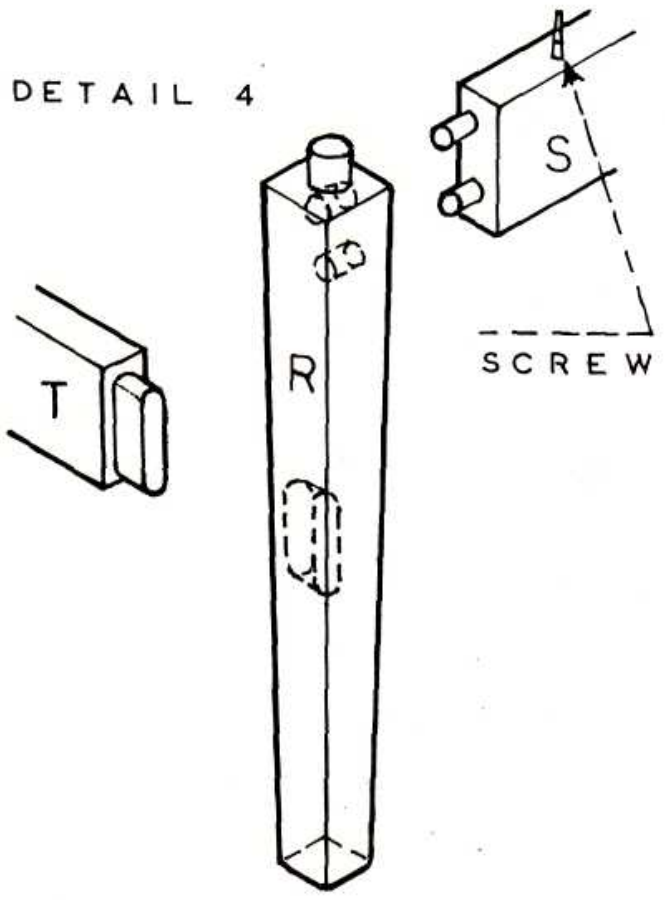

Instructions for Assembly

1. Join bottom (B), partition (E), rails (F, G) to side (C).
2. Attach top (A) and back (D).
3. Fasten cleats (H) to side (C) and partition (E).
4. Join drawer sides (K) to drawer fronts (J) and backs (L), and install bottoms (M).
5. Join drawer sides (N) to drawer fronts (O) and backs (P), and install bottoms (Q).
6. Fasten rails (S) and (T) to legs (R).
7. Attach rails (S) to bottom (C) with screws.
8. Apply finish.

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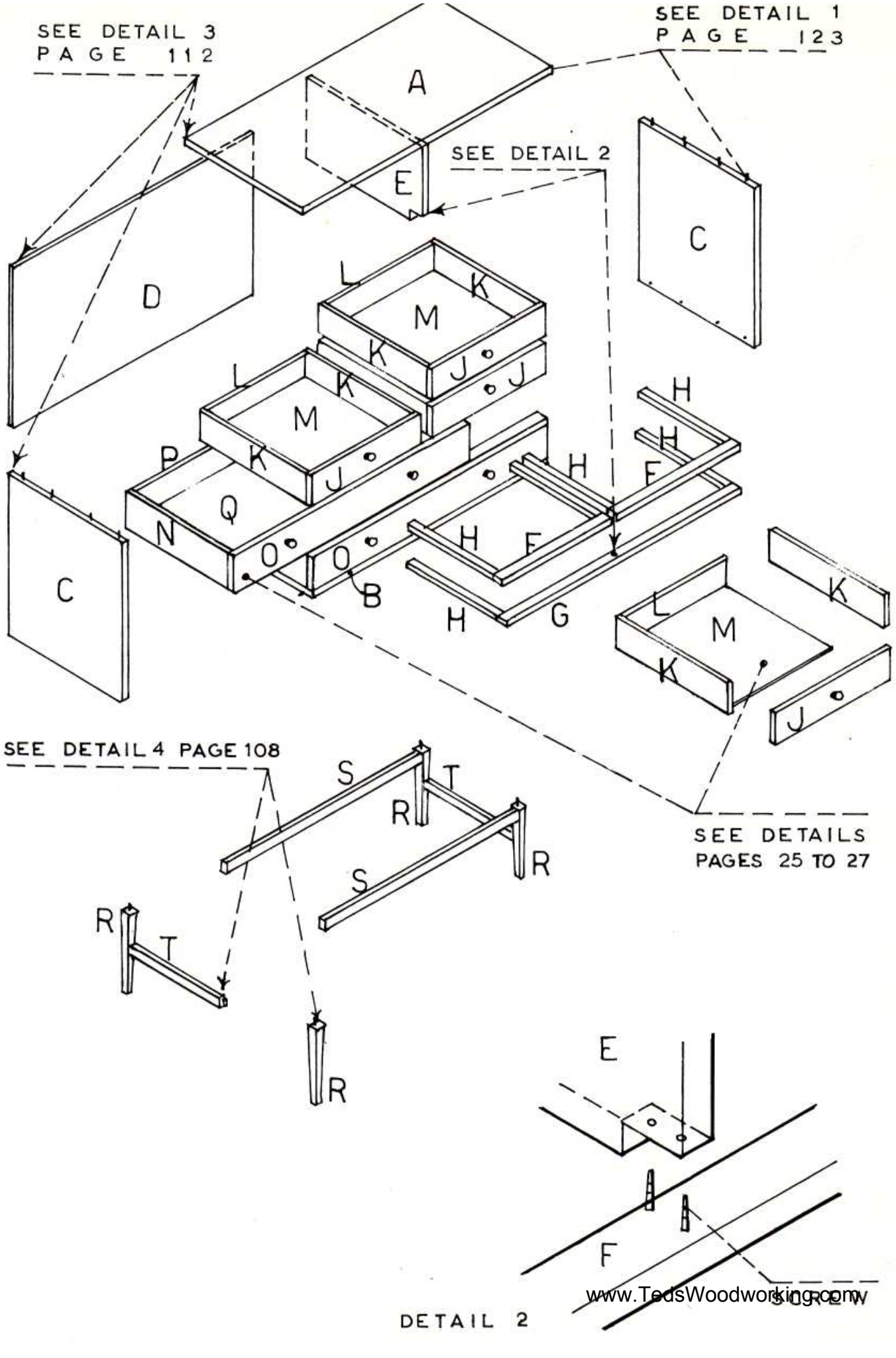

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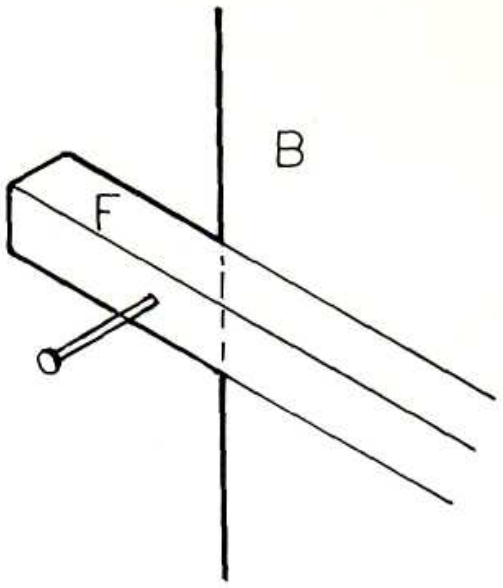
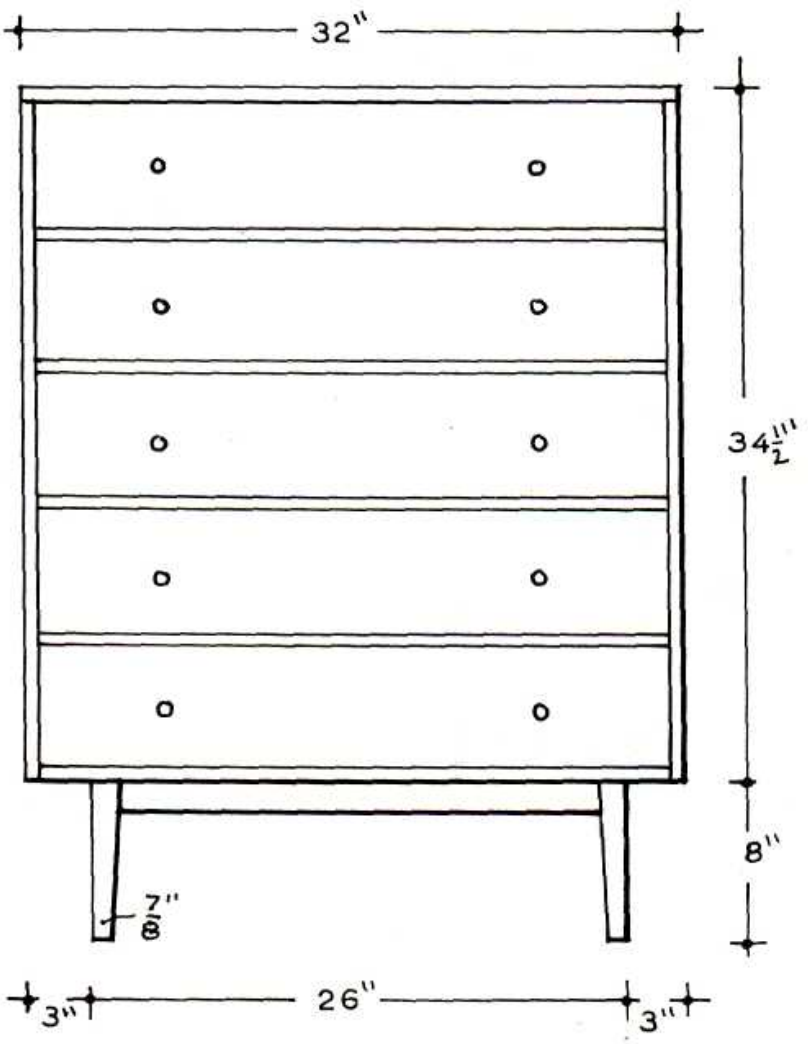
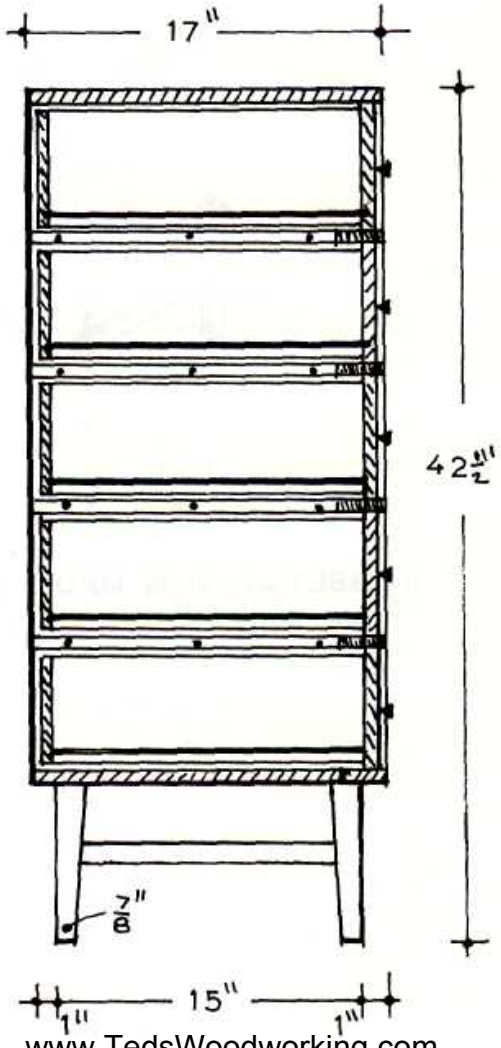
DETAIL 2



Instructions for Assembly

1. Join bottom (C) and rails (E) with side (B).
2. Install top (A) and back (D).
3. Attach cleats (F).
4. Join drawer sides (J) with drawer fronts (G) and backs (H) and install bottoms (K).
5. Fasten legs (L) to rails (M) and (O) and attach rails (M) to bottom (C) with screws.
6. Apply finish.





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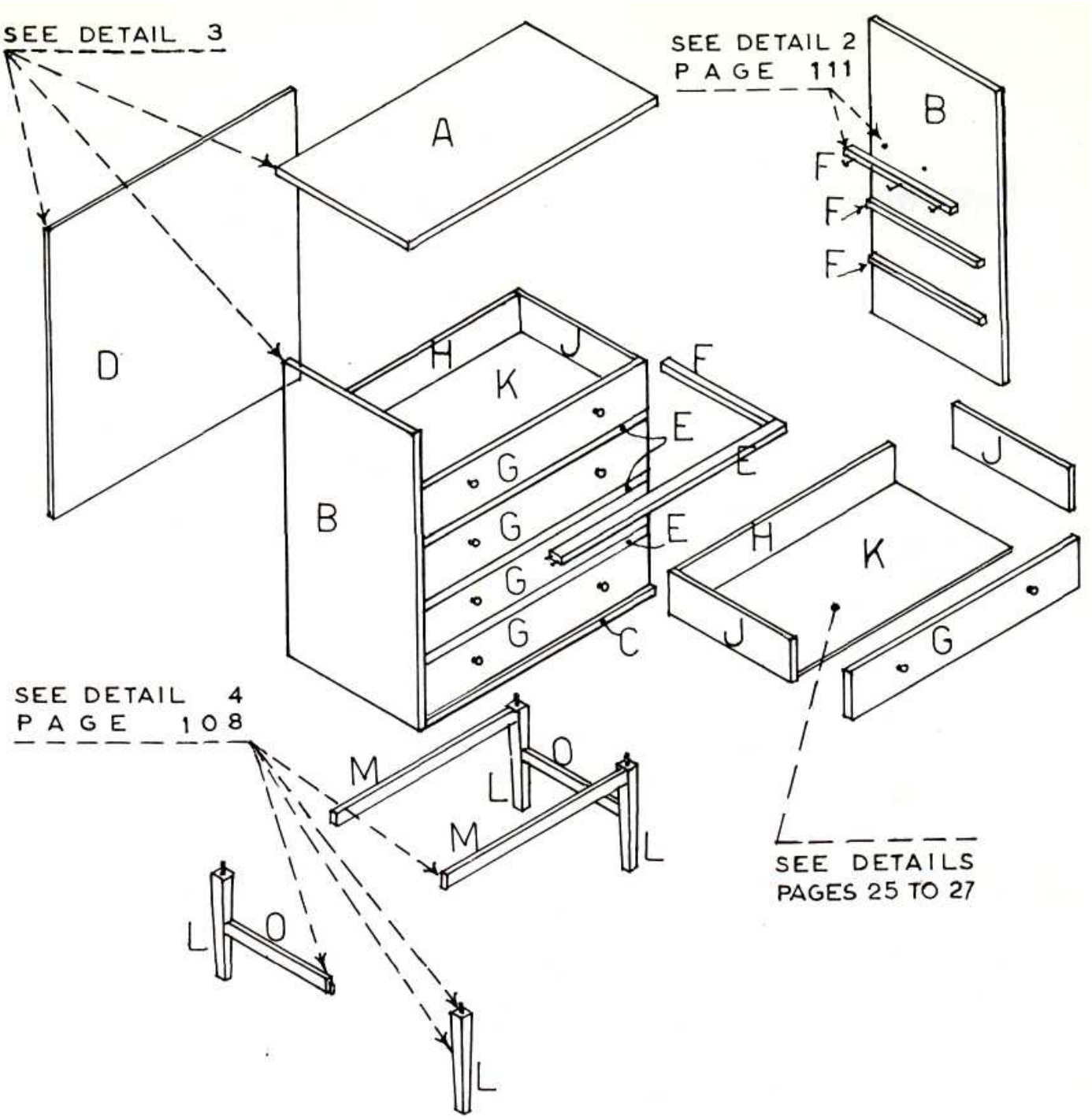
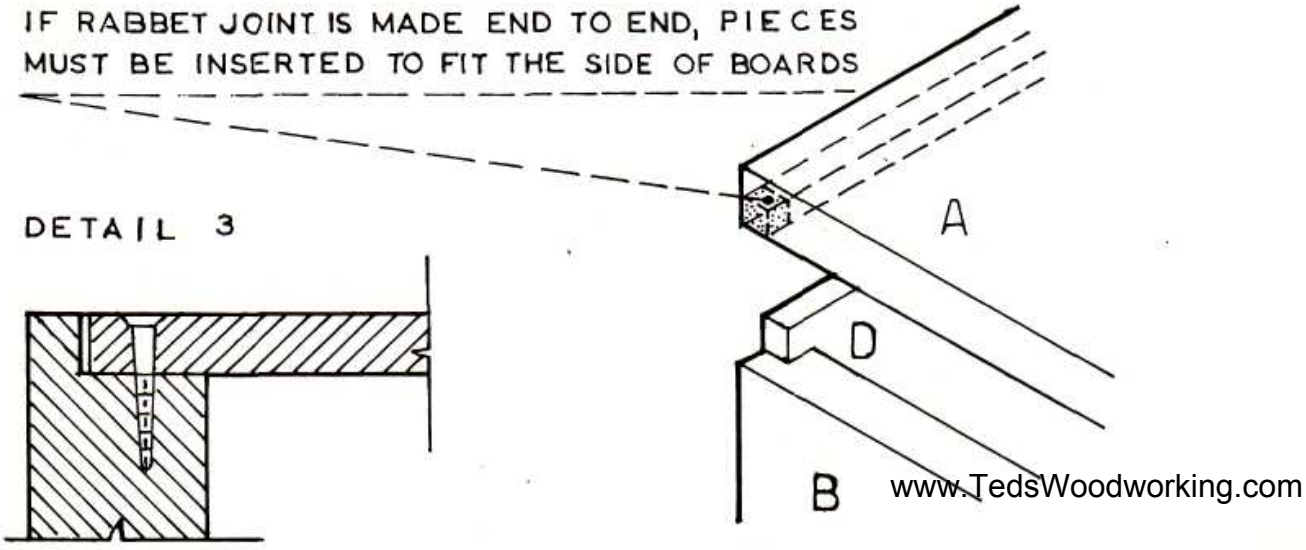


IF RABBET JOINT IS MADE END TO END, PIECES MUST BE INSERTED TO FIT THE SIDE OF BOARDS

DETAIL 3



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5.4 CHIFFOROBE

Like the wardrobe of Project 5.1, this practical piece "grows" with the user; when the dress compartment becomes too small it can be used as a cabinet by adding shelves. The chiffo-robe matches the chests of Projects 5.2 and 5.3, making a bedroom set of two or three pieces.

List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness	×	width	×	length
A	1	top	¾		17		45
B	2	sides	¾		17		27
C	1	partition	¾		16¾		26¼
D	1	bottom	¾		17		43½
E	1	back	¼		27¼		44½
F	3	rails	¾		2		25
G	6	cleats	¾		1		14¾
H	4	drawer fronts	¾		6		25
J	4	drawer backs	¾		5½		24
K	8	drawer sides	½		6		16⅜
L	4	drawer bottoms	¼		16¼		24½
M	4	legs	1½		1½		8
O	2	rails	¾		1½		34
P	2	rails	¾		1½		14½
Q	1	door	¾		26¼		17¾
R	1	dowel or pipe	1 diam.				17¾

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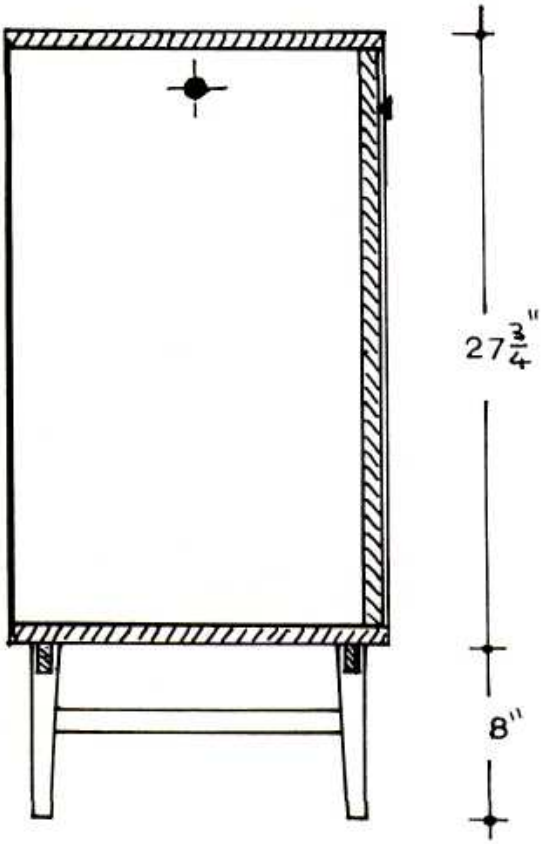
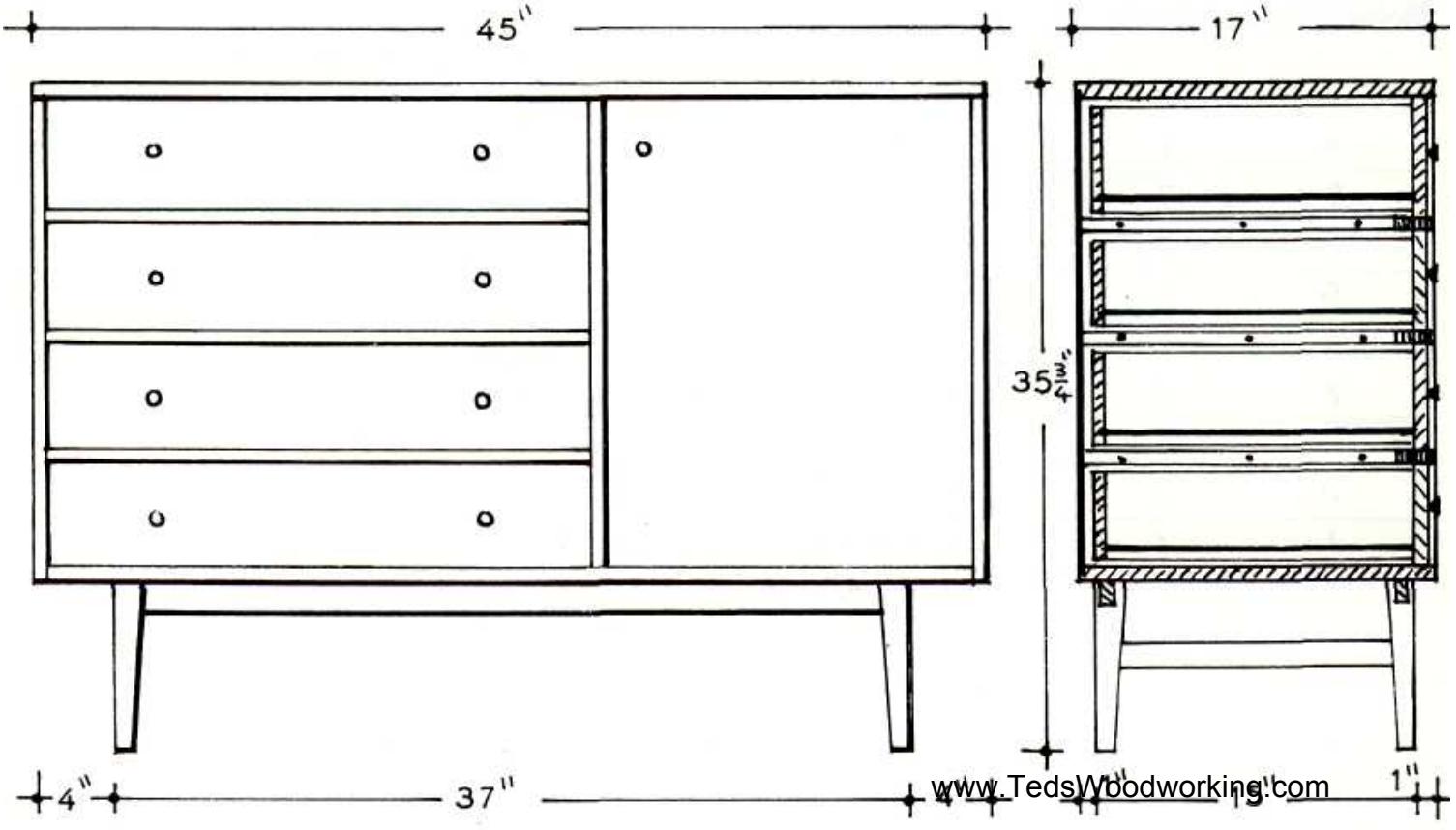
Instructions for Assembly

1. Join bottom (D), partition (C), rails (F) to sides (B).
2. Attach top (A) and back (E).
3. Fasten cleats (G) and pipe (R) to sides (B) and partition (C).
4. Join drawer sides (K) to fronts (H) and backs (J) and install bottoms (L).
5. Fasten legs (M) to rails (O) and (P) and attach base to bottom (C) with screws.
6. Apply finish.





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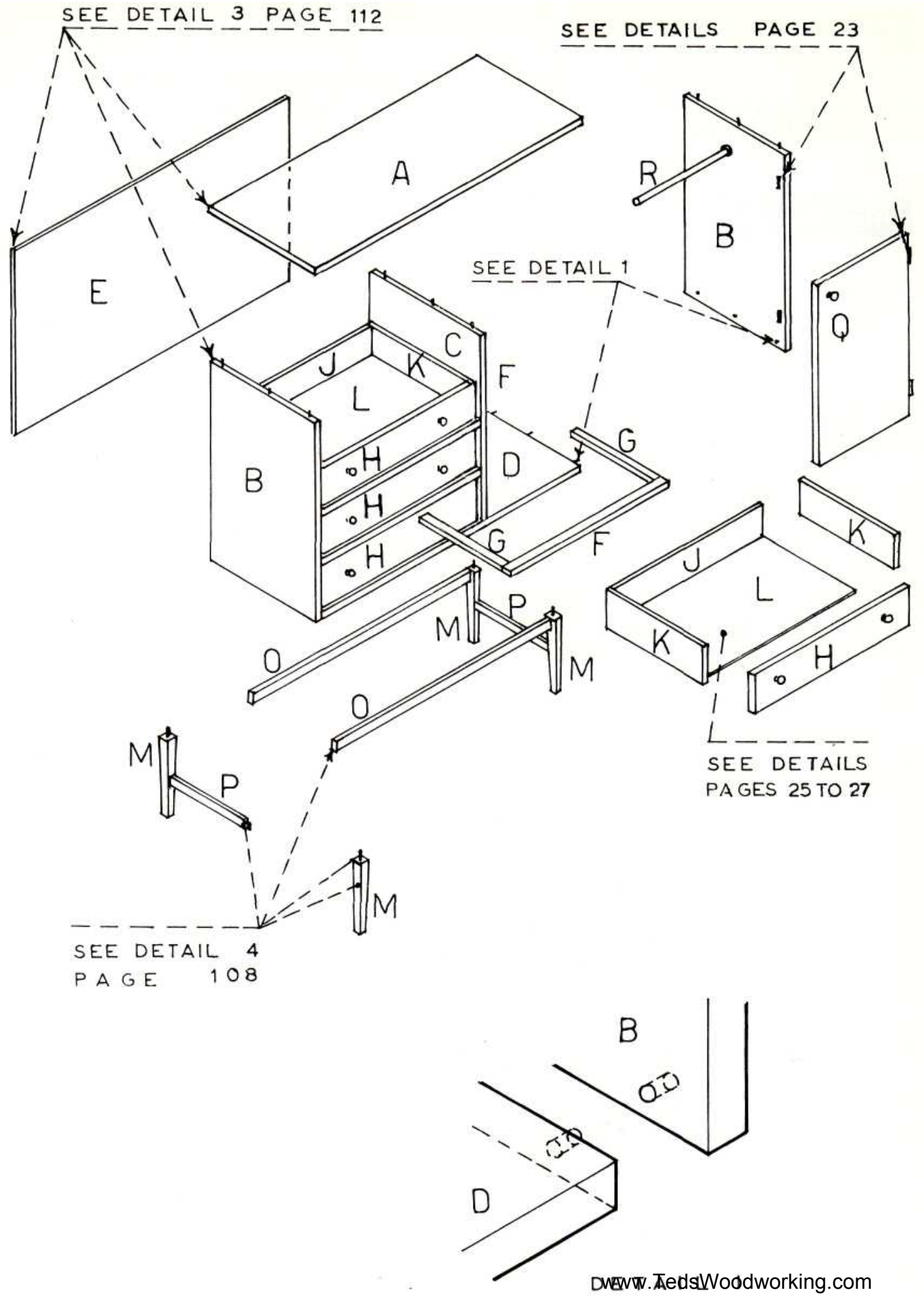

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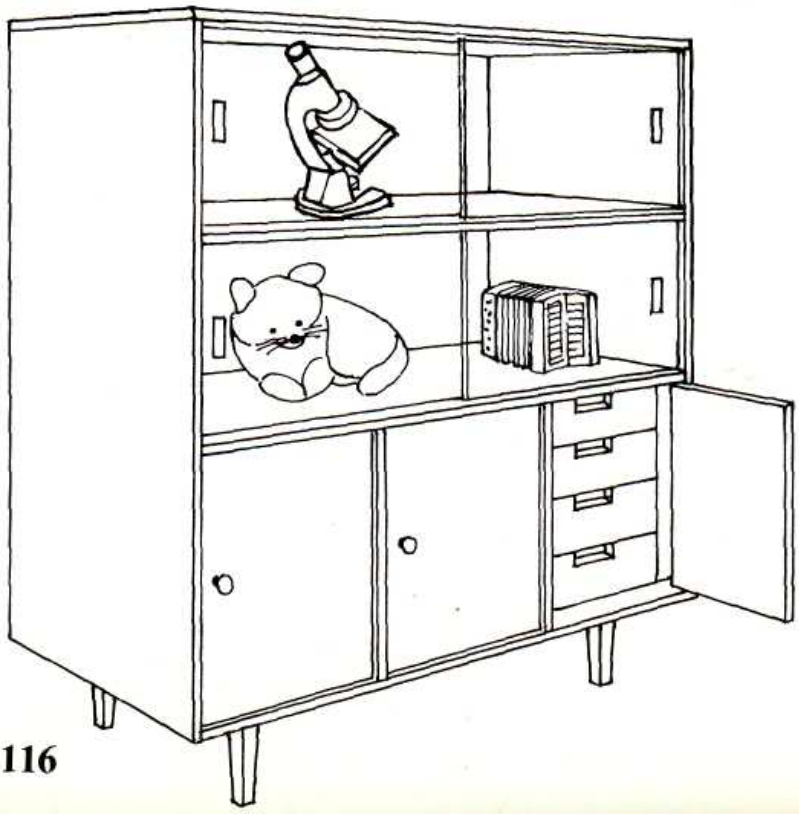
5.5 DISPLAY CABINET

This professional-looking piece lends an air of neatness to a room and protects fragile models, sculpture, trophies and souvenirs from dust and damage. The shallow drawers behind doors are ideal for collections of rocks, shells, microscope slides, butterflies, leaves and the like.

List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness	×	width	×	length
A	1	top	¾		15		54
B	2	shelves	¾		14¾		52½
C	1	bottom	¾		15		52½
D	2	sides	¾		15		45¼
E	1	back	¼		45½		53½
F	2	partitions	¾		14¾		17
G	4	plate glass doors	¼		13½		26¾
H	3	doors	¾		17		17
J	4	tray fronts	¾		4¼		16
K	4	backs	½		3¾		15
L	8	sides	½		4¼		13¼
M	4	bottoms	¼		15½		13
O	4	legs	1½		1½		7
P	2	rails	1		1¾		10¼
Q	1	rail	1		1¾		41¼
R	8	cleats	⅜		¾		12½
S	1	filler	1		13½		17



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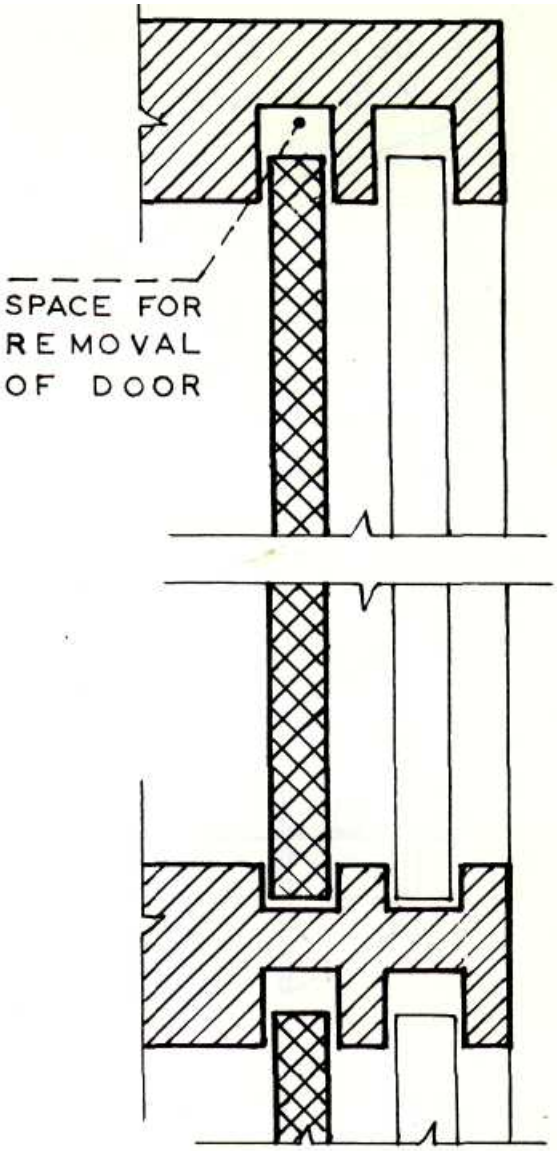
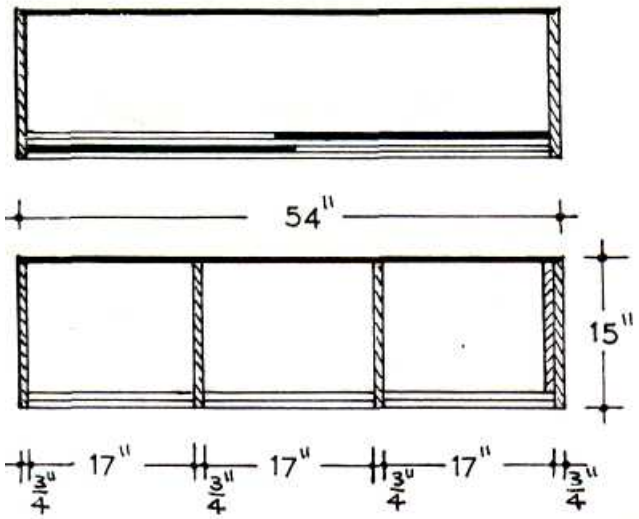
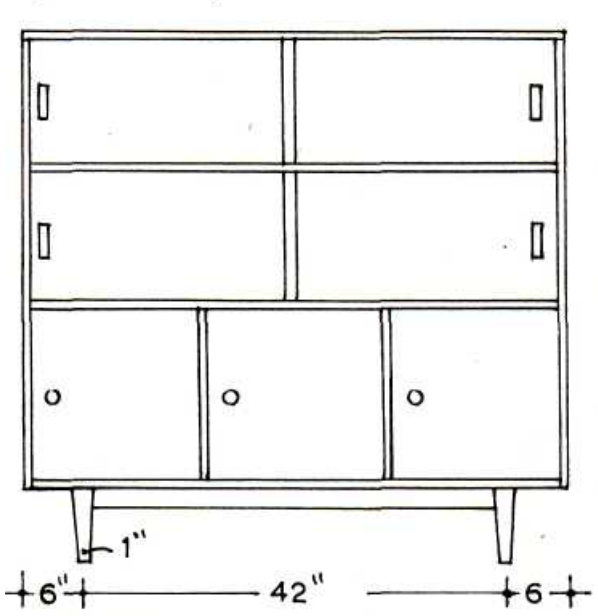
Instructions for Assembly

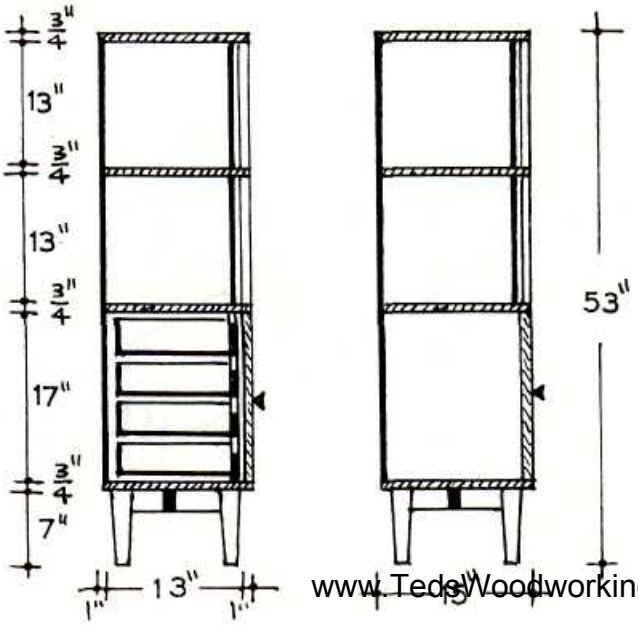
1. Join top (A), shelves (B), partition (F) and bottom (C) to sides (D).
2. Install back (E).
3. Attach filler (S) to side (D) and fasten cleats (R) to partition (F) and filler (S).
4. Join tray sides (L) to fronts and backs (J, K) and install bottom (M).
5. Fasten rails (P) to legs (O).
6. Join rail (Q) to rails (P) and attach base to bottom (C).
7. Attach door (H) to side (D) and partition (F).
8. Apply finish.
9. Install plate glass doors (G).



DETAIL 4
FULL SIZE







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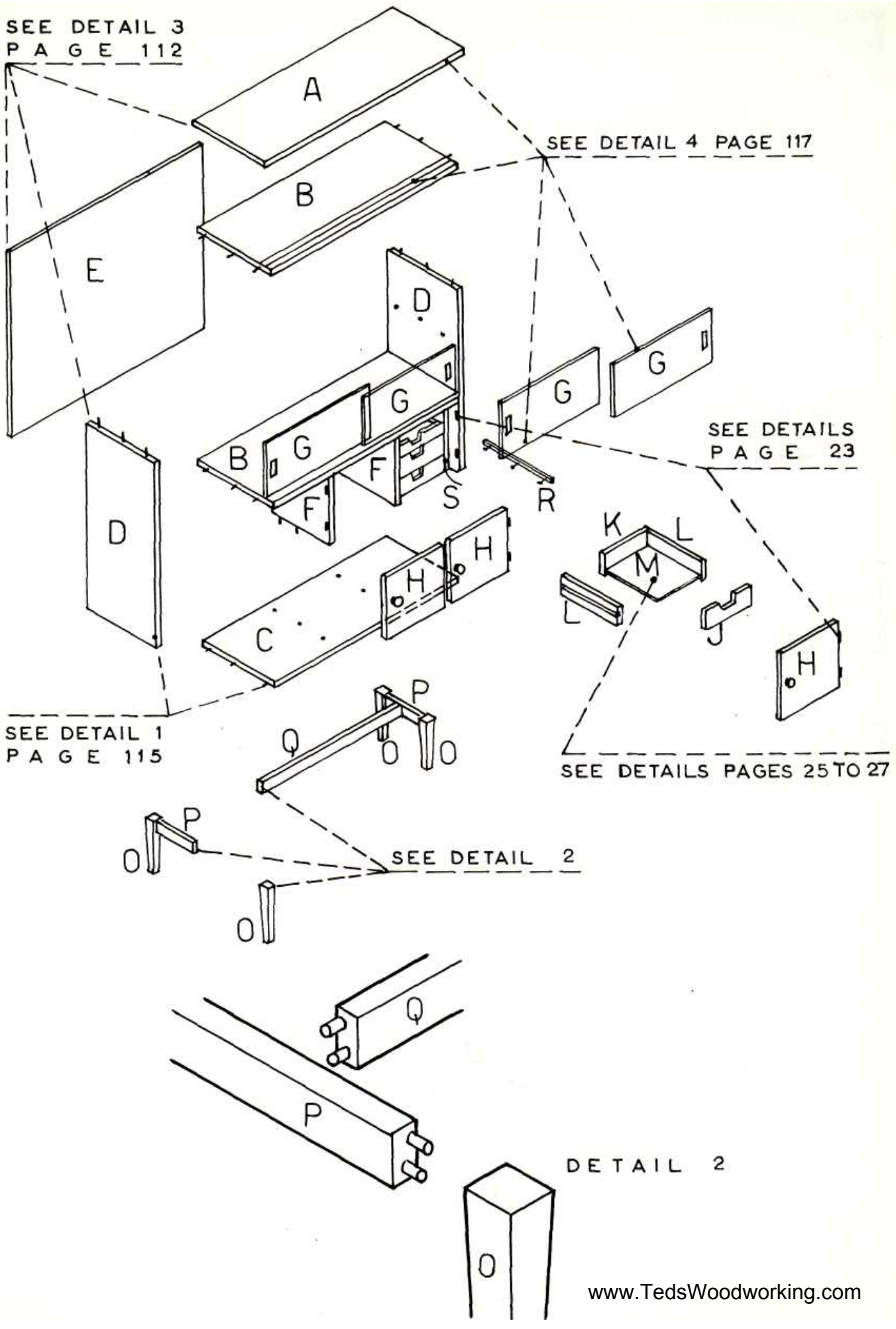

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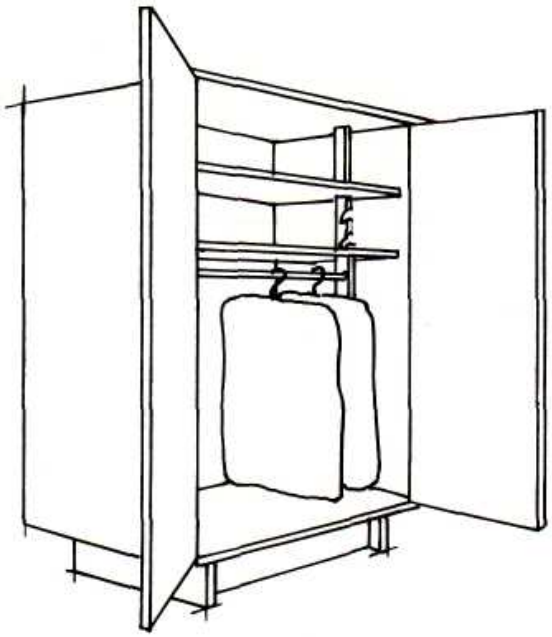
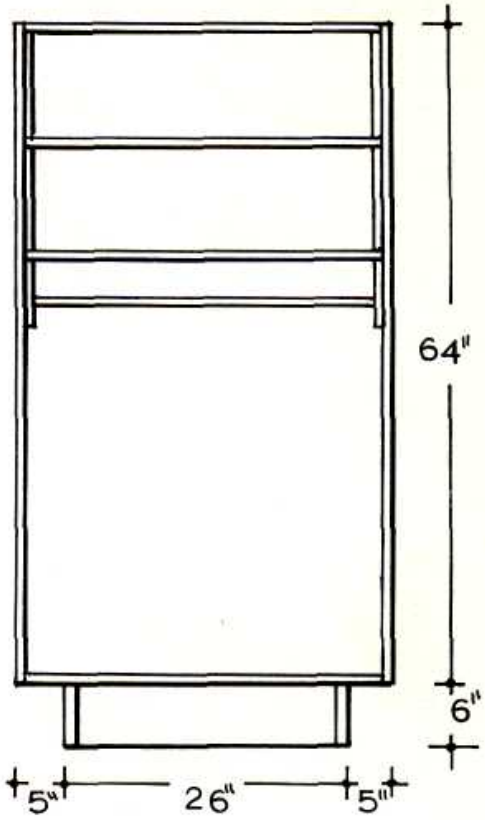
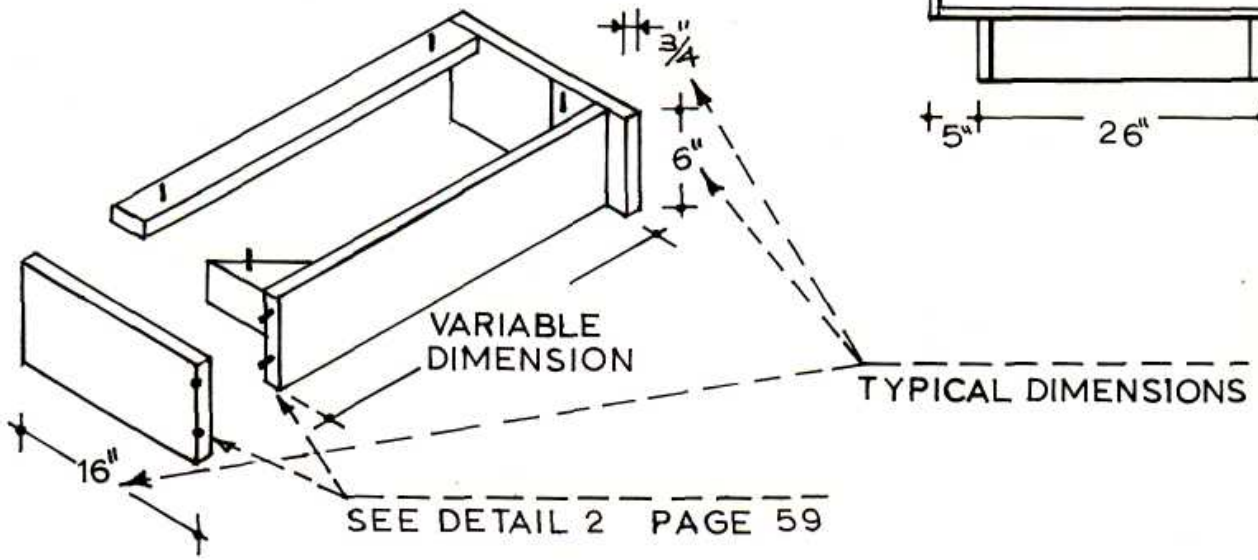
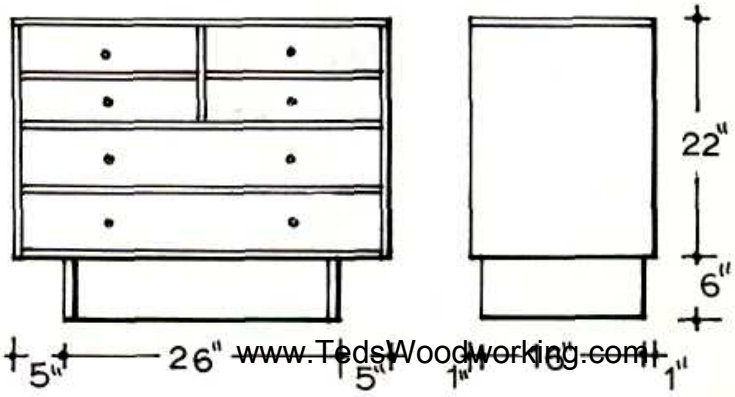
5.6 BASE VARIATIONS FOR WARDROBES, CHESTS, ETC.

To satisfy the particular needs of different people, here are some variations affecting the base supports of these useful pieces of furniture.









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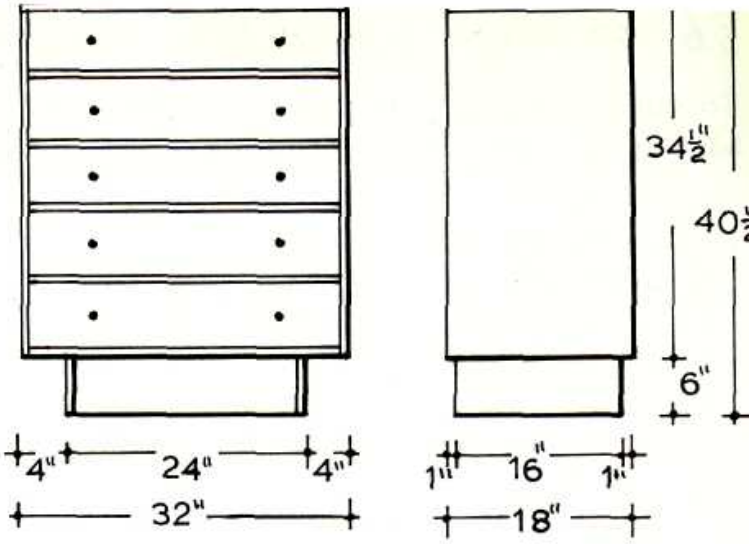

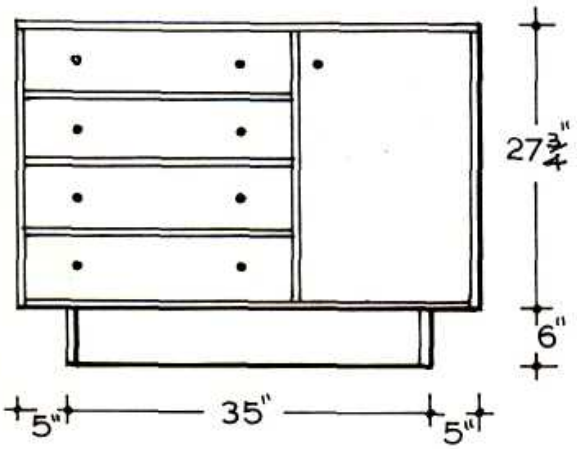

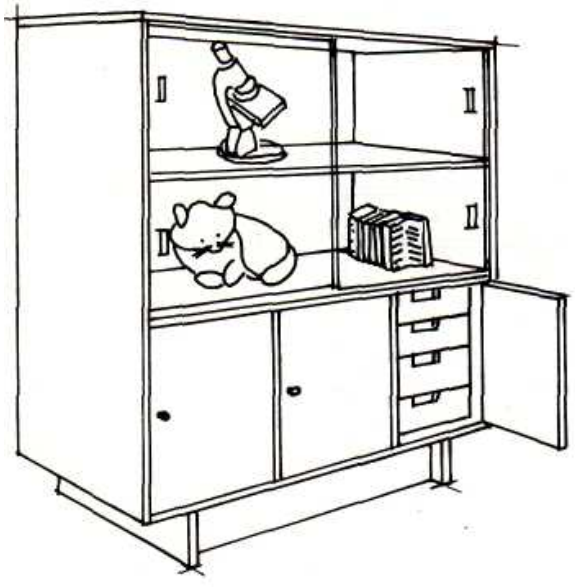

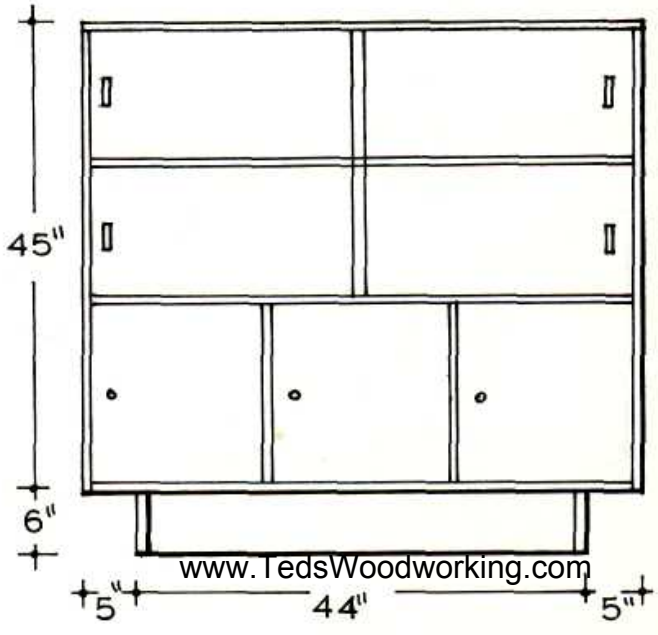

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5.7 STORAGE CABINET

No child ever has enough space for storing things, but this cabinet will be a step in the right direction. Designed to serve from toddlerhood to adulthood. Best of all, it's easy to put together.

List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness	×	width	×	length
A	1	top	¾		15		W
B	1	shelf	¾		14¾		× W less 1½
C	1	bottom	¾		15		× W less 1½
D	2	sides	¾		15		32¼
E	1	back	¼		32½		× W less ½
F	6	partitions	¾		14¾		15⅜
G	2	doors	¾		15⅜		16½
H	1	toeplate	¾		3		W
J	2	toeplates	¾		3		12
K	2	corner blocks	¾		3		3

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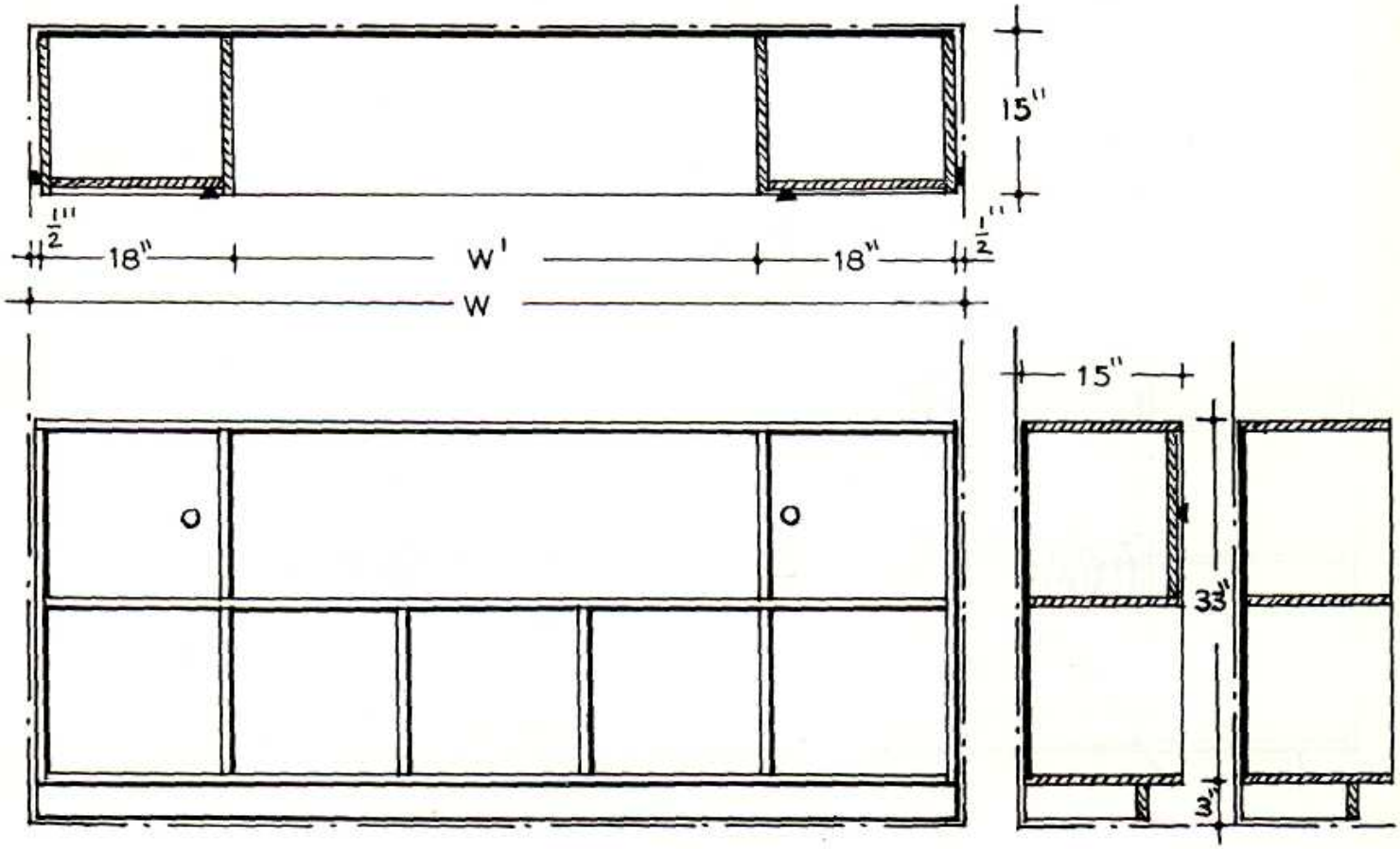
Instructions for Assembly

1. Fasten shelf (B) and bottom (C) to partitions (F) and sides (D).
2. Attach top (A) and install back (E).
3. Join toeplates (H) and (J) to corner blocks (K) and fasten to bottom (C).
4. Install doors (G) on side (D).
5. Apply finish and set cabinet in place.

W = WIDTH OF THE ROOM
W' = WIDTH OF THE ROOM LESS 37"



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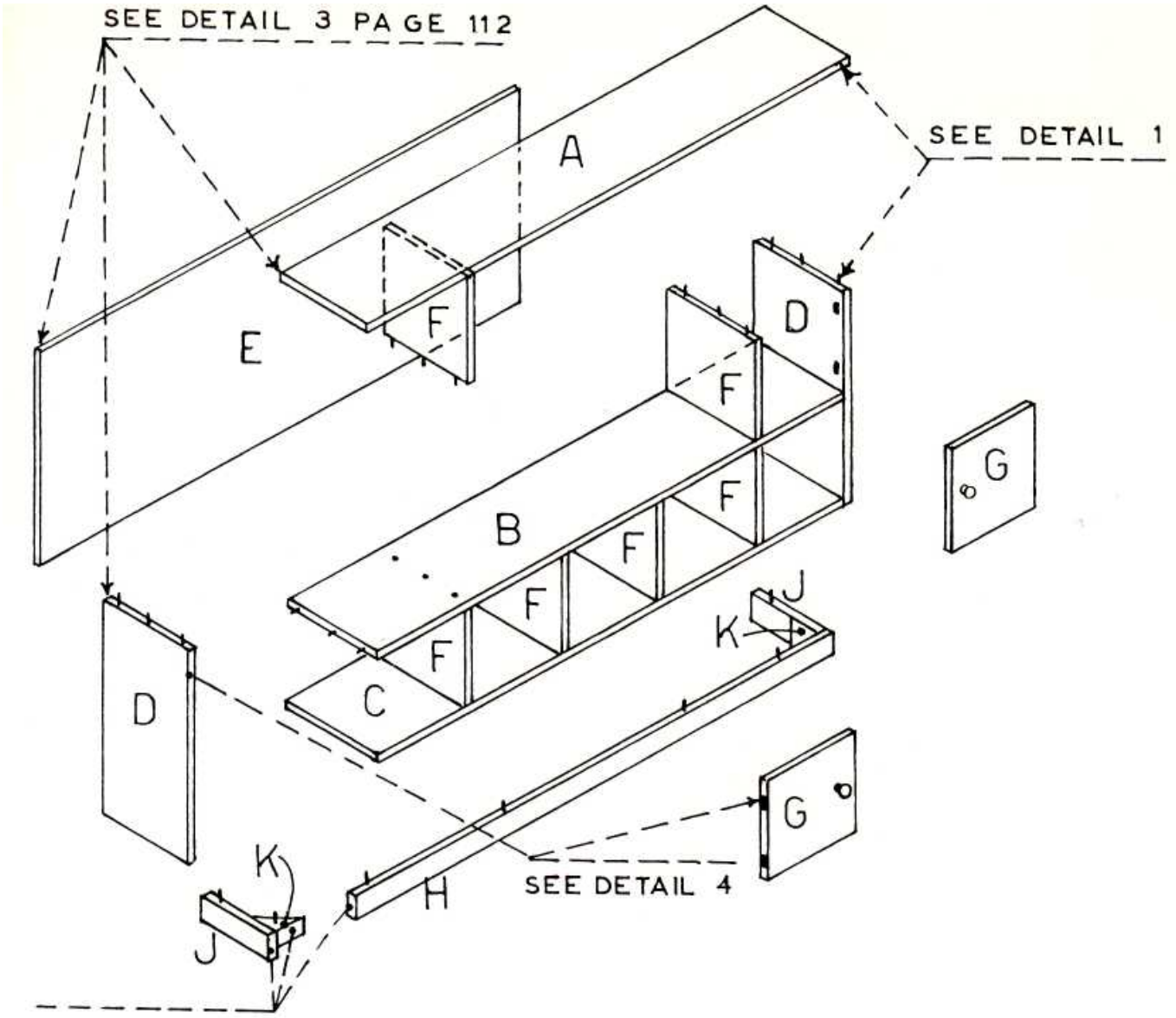
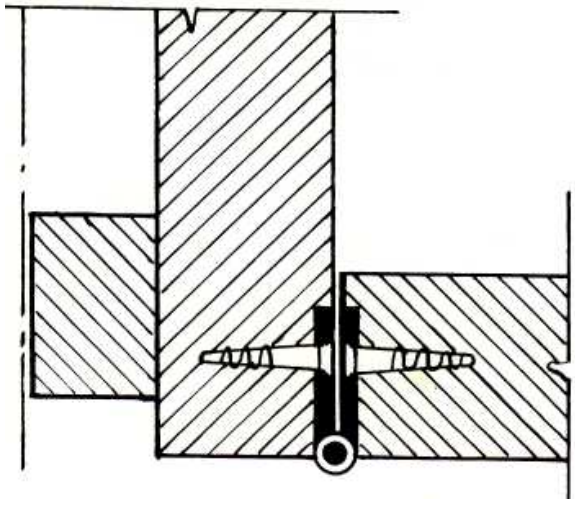
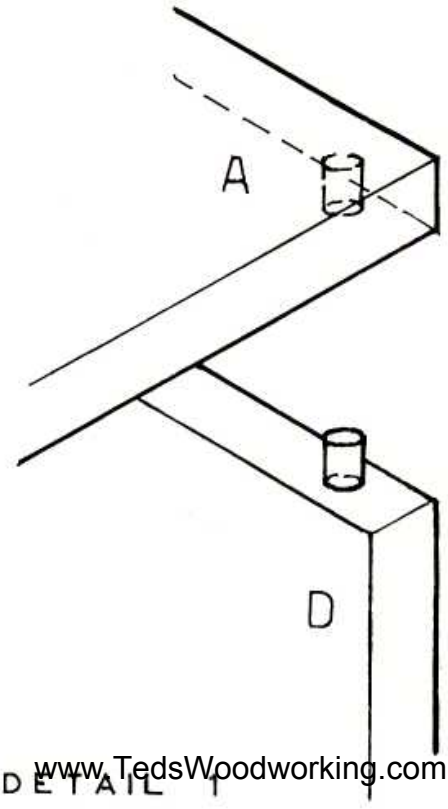


DETAIL 4 FULL SIZE





DETAIL 1

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5.8 TOY CHEST AND BENCH

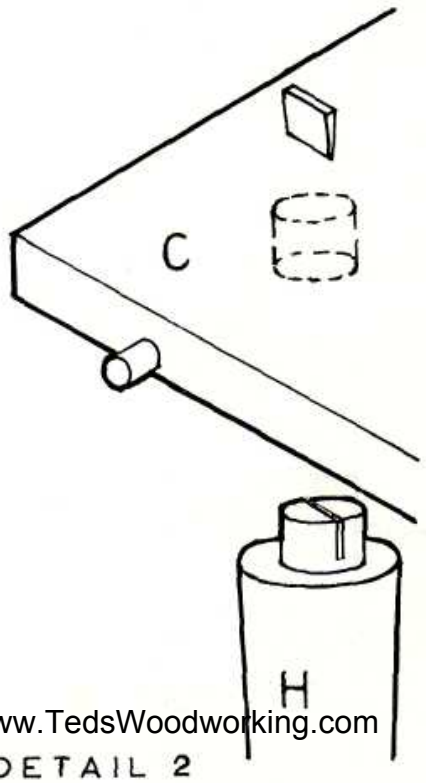
The addition of the graceful back and sides takes this practical storage bin out of the foot-locker category; its very appearance encourages neatness. A word of advice: don't use it to store broken, discarded toys and "junk," so that it loses half its utility.

List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length		
A	2	sides	¾	15½	16
B	2	panels	¾	7½	28½
C	1	bottom	¾	13½	28½
D	1	top	¾	13½	28½
E	1	board	¾	2	28½
F	1	back	¾	3	28½
G	8	dowels	⅜ diam.		7
H	4	legs	1¼ top diam.		4

Instructions for Assembly

1. Join panels (B) to bottom (C).
2. Insert dowels (G) in rails (E, F).
3. Fasten side (A) to (B), (C), (E) and (F).
4. Install top (D) on board (E) with two hinges.
5. Attach legs (H) to bottom (C).
6. Apply finish.



DETAIL 2

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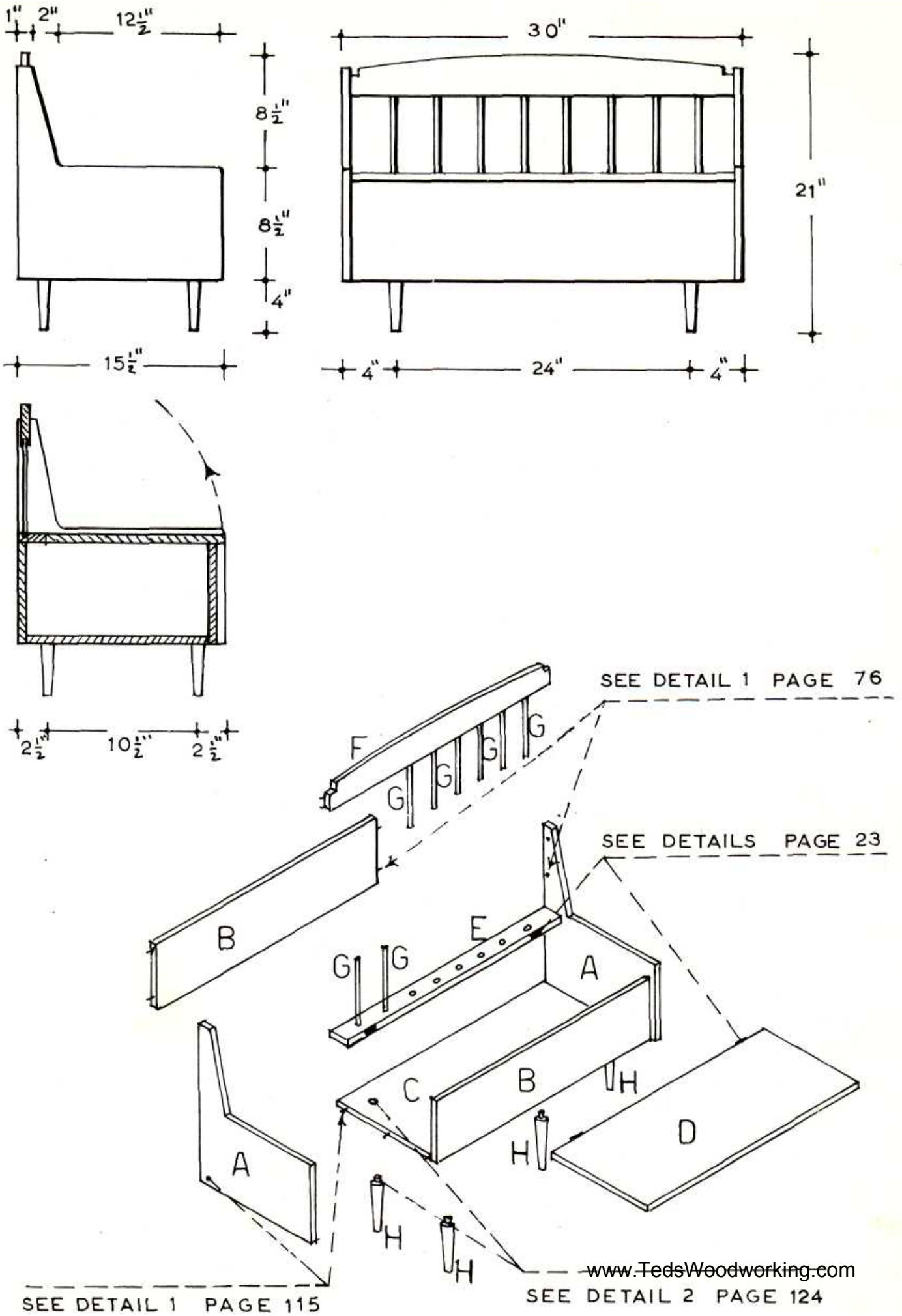

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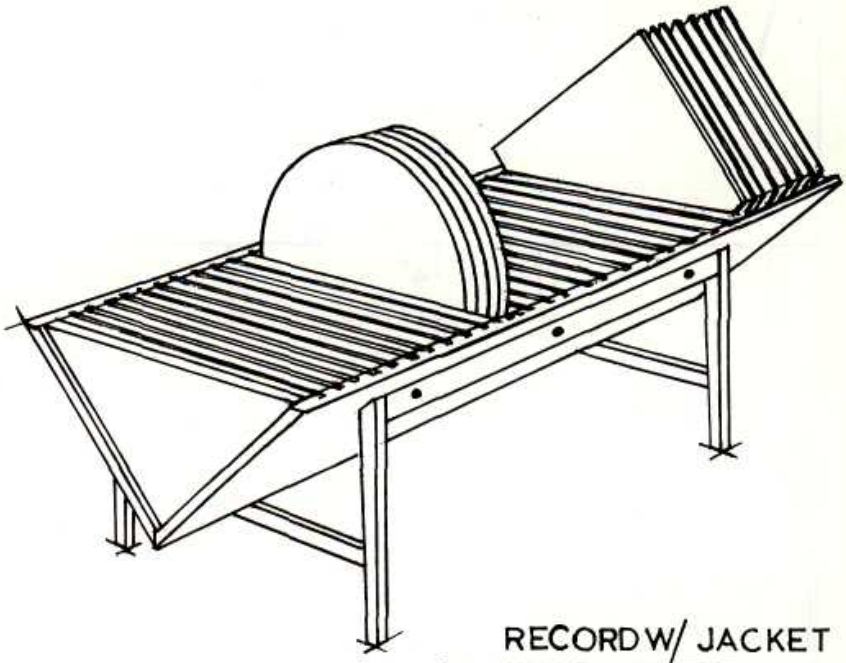
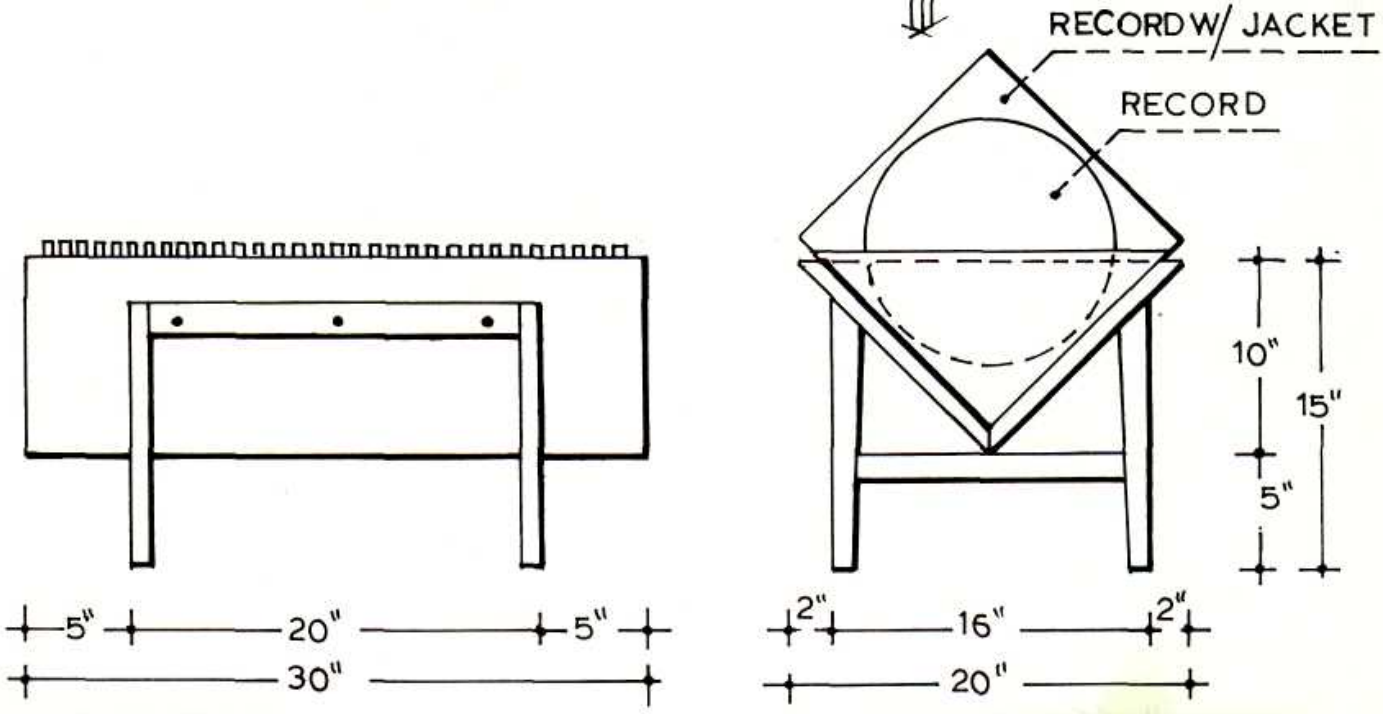
5.9 RECORD STORAGE

This is an easy piece to make, and a practical one for the teenage record collector. The use of plywood is advised for the v-shaped box and solid wood for the support.





List of Materials

A	2	sides	¾	8½	17
B	2	fronts	¾	14	30
C	4	legs	1	1¼	13½
D	2	rails	1	1½	18
E	2	rails	⅝	1	14
F	20	partitions	3/16	13	13

Instructions for Assembly

1. Join sides (A) with fronts (B).
2. Fasten rails (E) to legs (C), and rails (D) also to legs (C).
3. Attach rails (D) to fronts (B).
4. Apply finish.

Note. Cut partitions (F) on the diagonal. Taper bottom to form triangular partitions.

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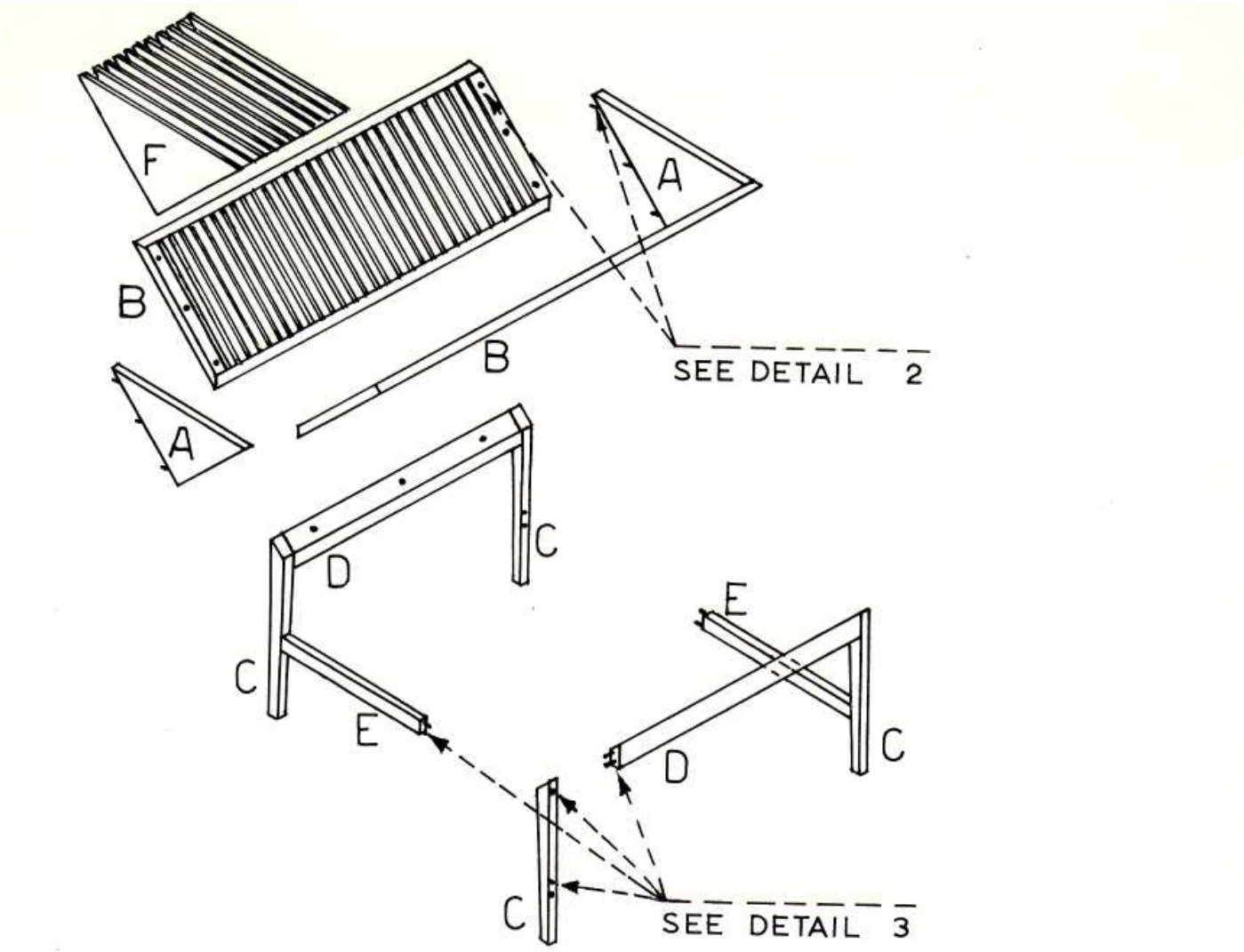
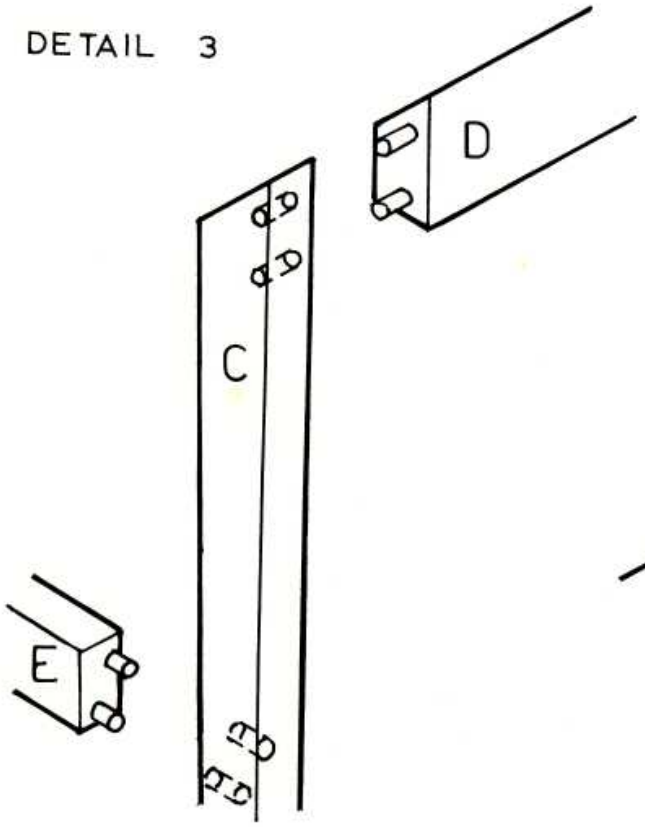
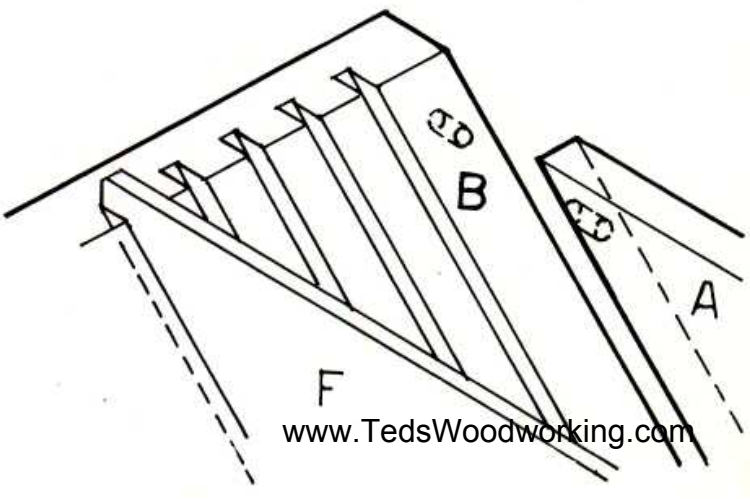


DETAIL 3



DETAIL 2



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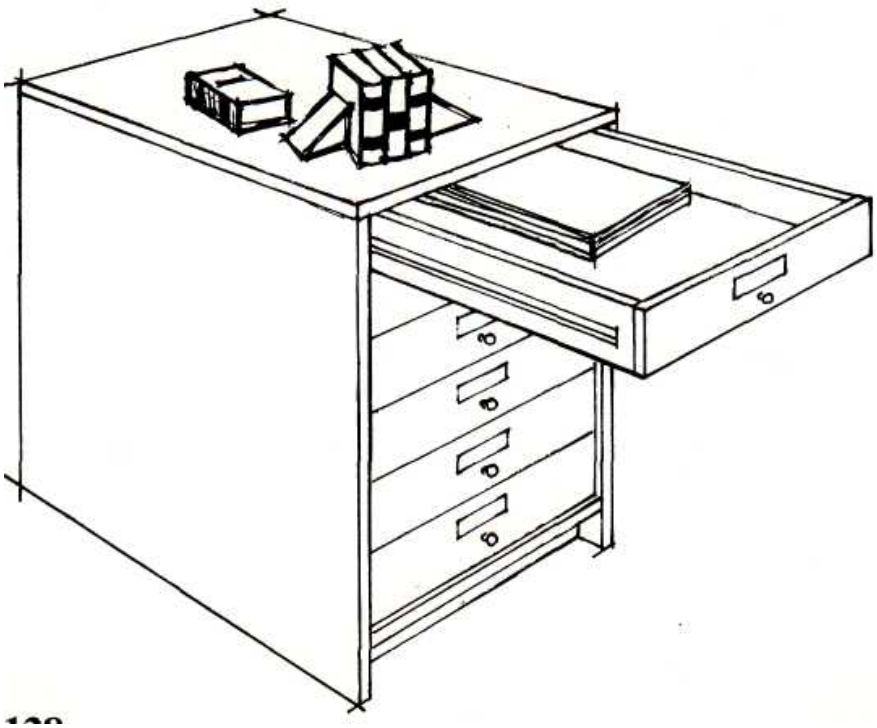
5.10 CHEST for stationery or art materials

We all know how a pad of expensive drawing or tracing paper can get dog-eared and shredded just "lying around." Here is a businesslike cabinet for storing all sorts and sizes of stationery, construction paper, crepe paper, water-color paper, pastel pencils, oil tubes, rulers and triangles. Plywood frame, with drawers of either plywood or solid wood. Drawer plates help keep things orderly.

List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness	×	width	×	length
A	1	top	¾		18		24
B	2	sides	¾		24		27¼
C	1	bottom	¾		16½		24
D	1	back	¼		17½		25
E	1	toeplate	¾		2½		16½
F	12	cleats	⅜		¾		22½
G	6	drawer fronts	¾		4		16½
H	6	drawer backs	½		3½		15½
J	12	drawer sides	½		4		23¼
K	6	drawer bottoms	¼		16		23



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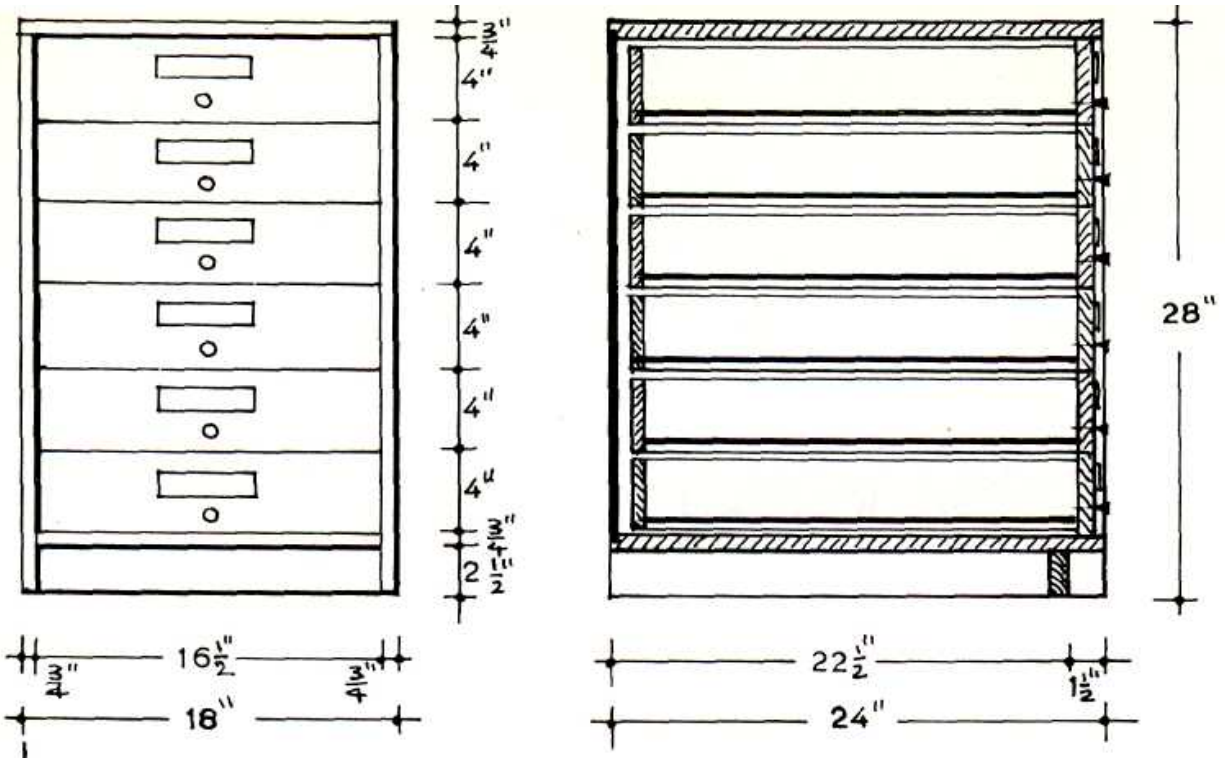
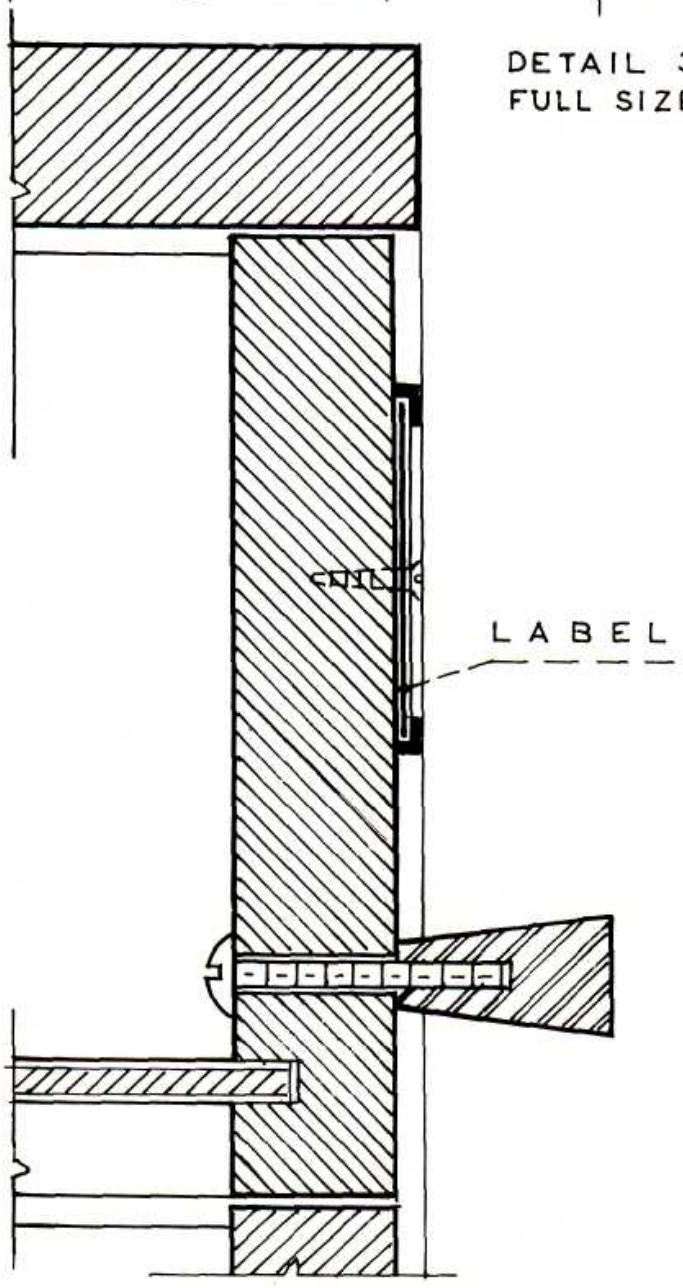


DETAIL 3
FULL SIZE



Instructions for Assembly

1. Join top (A) and bottom (C) to sides (B).
2. Install back (D).
3. Attach cleats (F) to side (B) and toeplate (E) to side (B) and bottom (C).
4. Join drawer sides (J) to drawer fronts (G) and backs (H) and install bottoms (K).
5. Apply finish.

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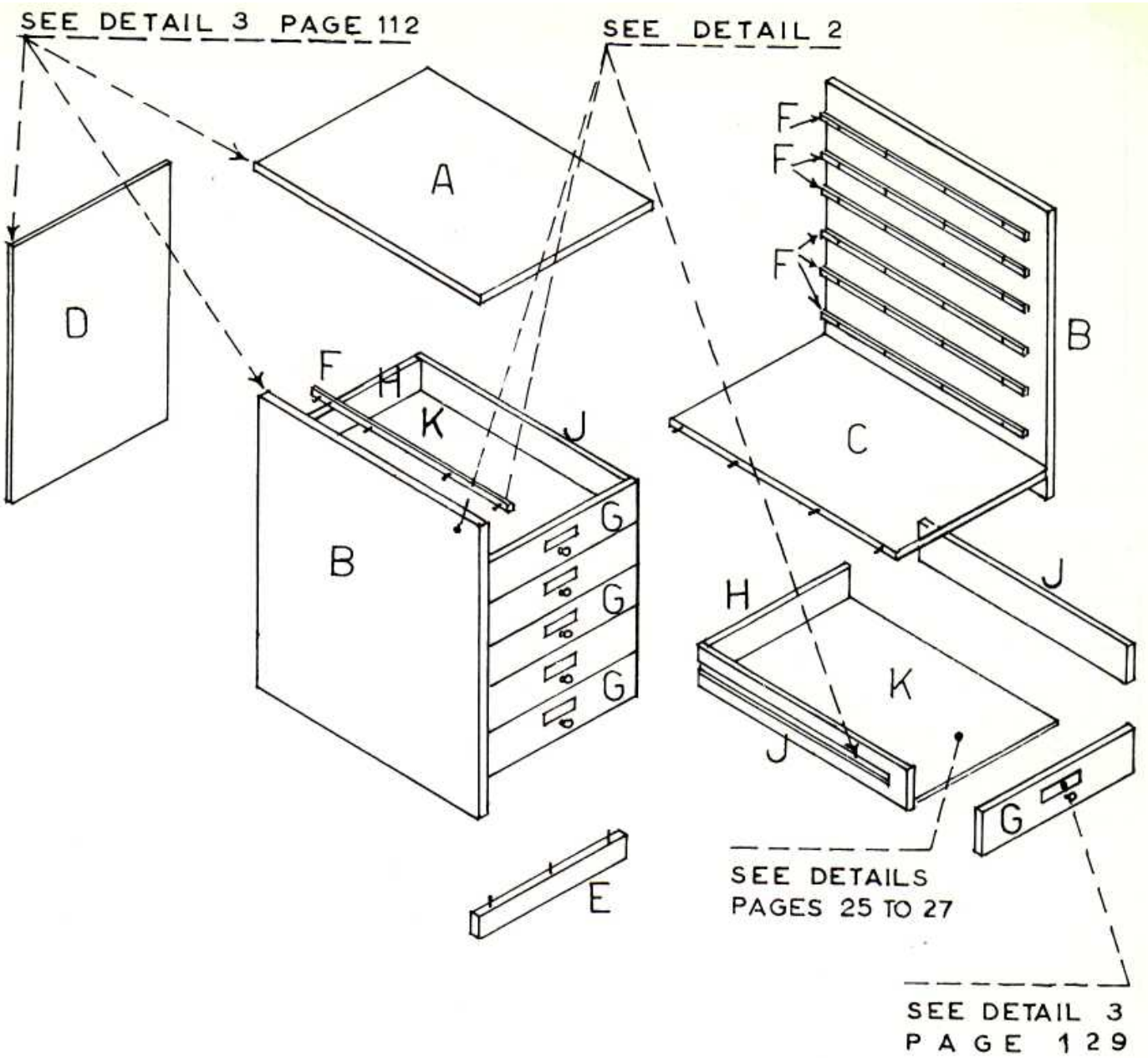
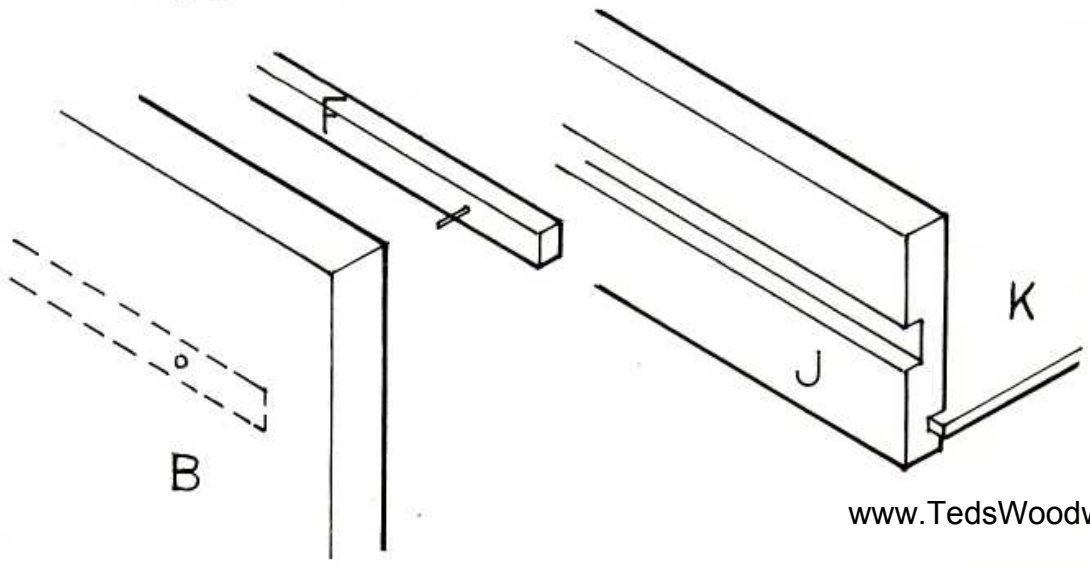


DETAIL 2



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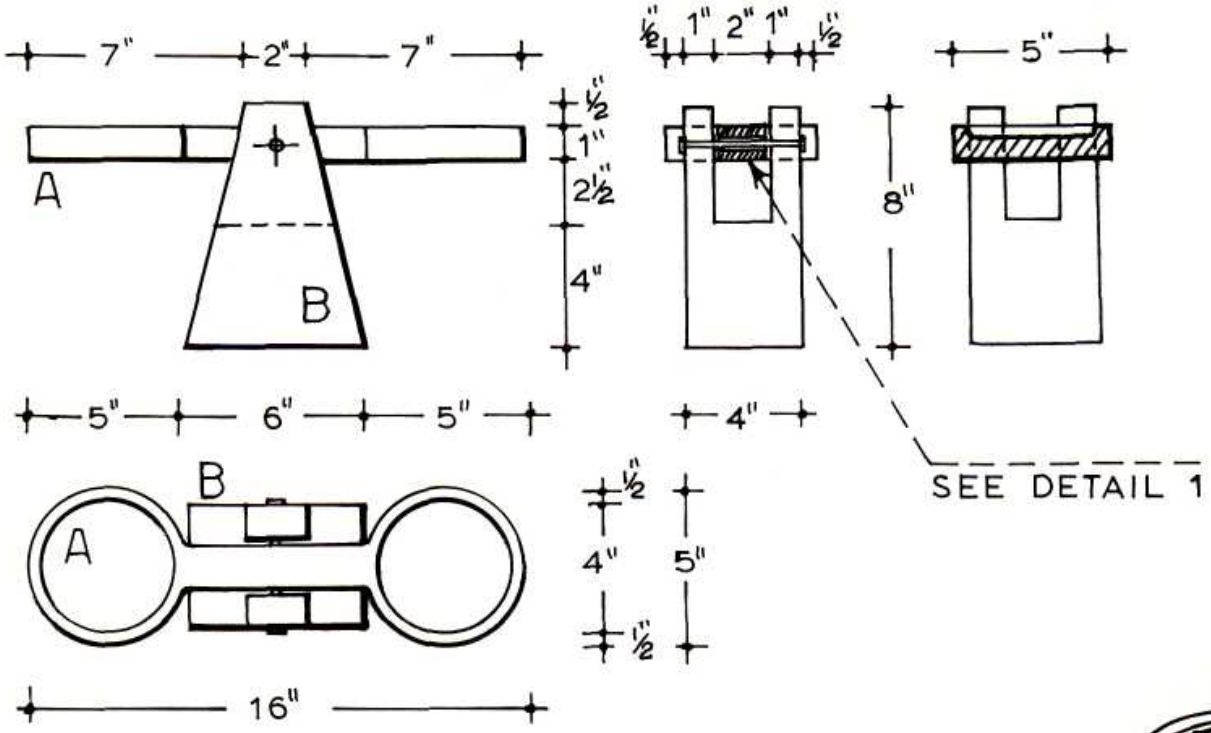
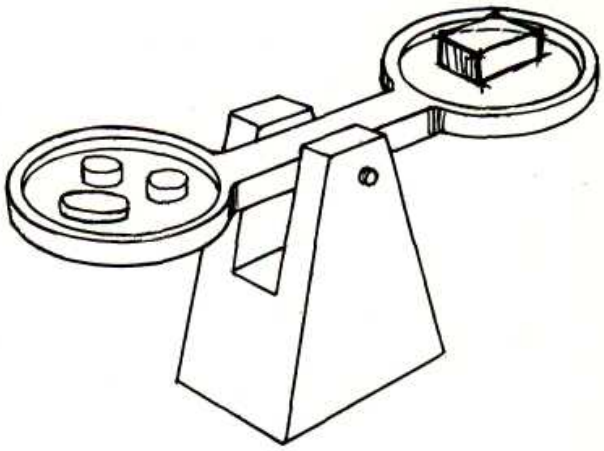
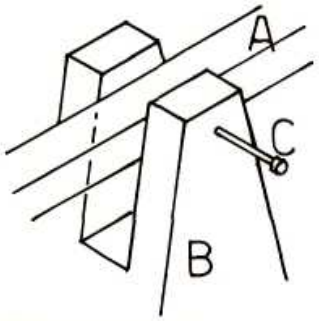
6.1 MOTION AND BALANCE TOY

This toy can be entertaining and educational as well, for it will give pleasure to your child while giving the child the opportunity to discover how mass and volume relate to each other when different materials, such as metal and wood, are involved.





DETAIL 1



List of Materials

A	1	top	1	5	16
B	1	block	4	6	8

Instructions for Assembly

1. Shape top (A) as indicated in the drawing.
2. Prepare block (B).
3. Apply finish.
4. Join together top (A) and block (B) with bolt (C).

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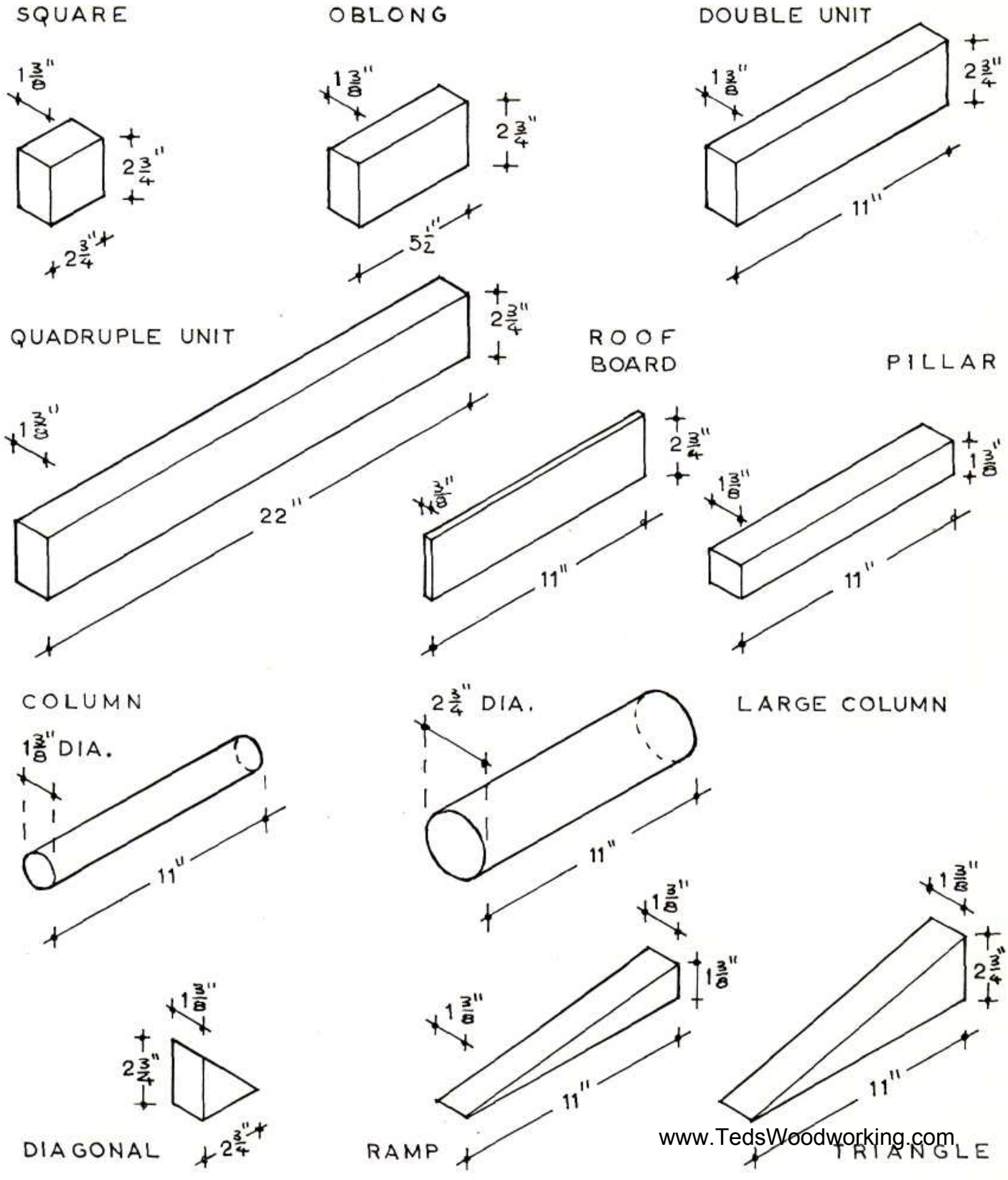
6.2 STANDARD CONSTRUCTION BLOCKS

The variety of imaginative structures that can be built with these blocks is almost endless. All you need is a power saw, a ruler and enough wood to make several dozen copies of each of the indicated pieces—more of the oblongs or "bricks," fewer of the circular pieces and columns. The big problem, of course, is to see that all pieces are stowed away when play is over! Avoid using soft wood, which has a tendency to split or splinter—try maple or birch for best results.



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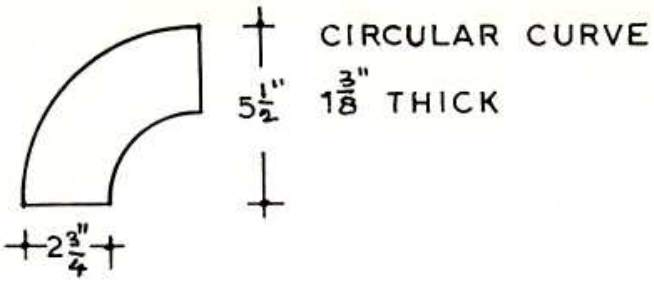
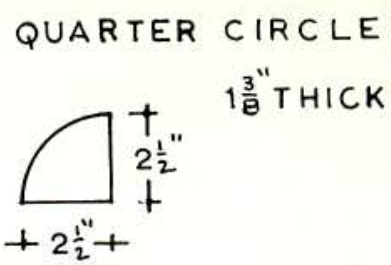
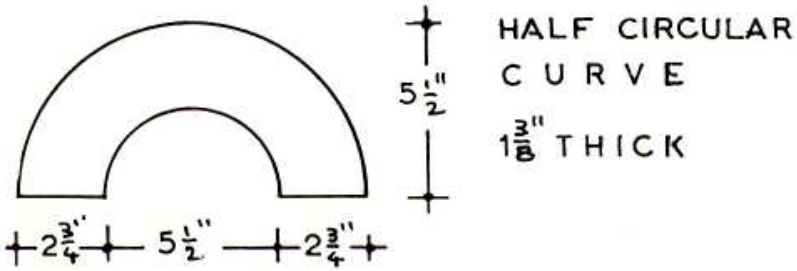
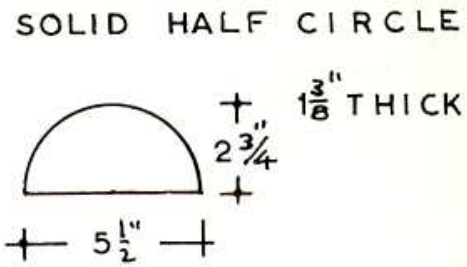
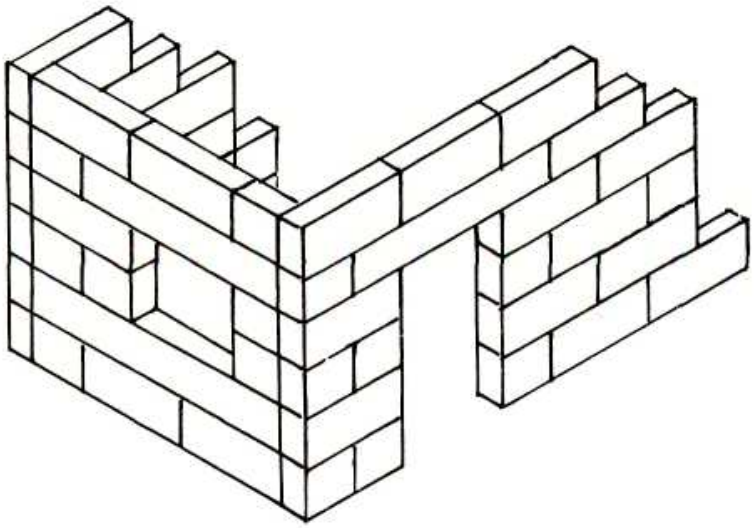








BUILDING



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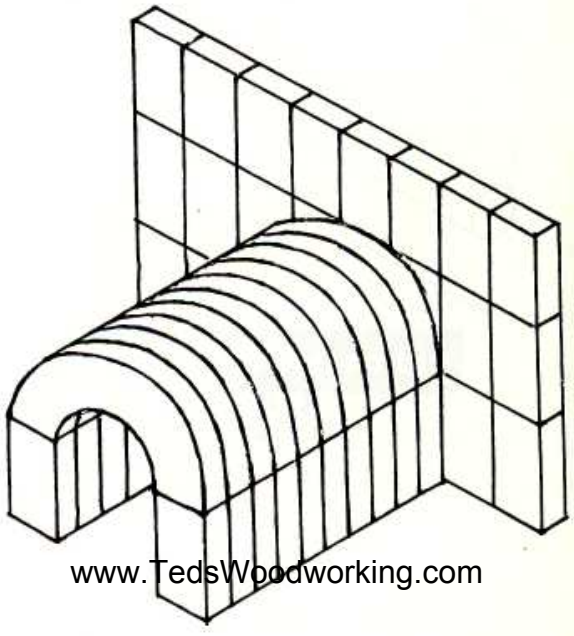

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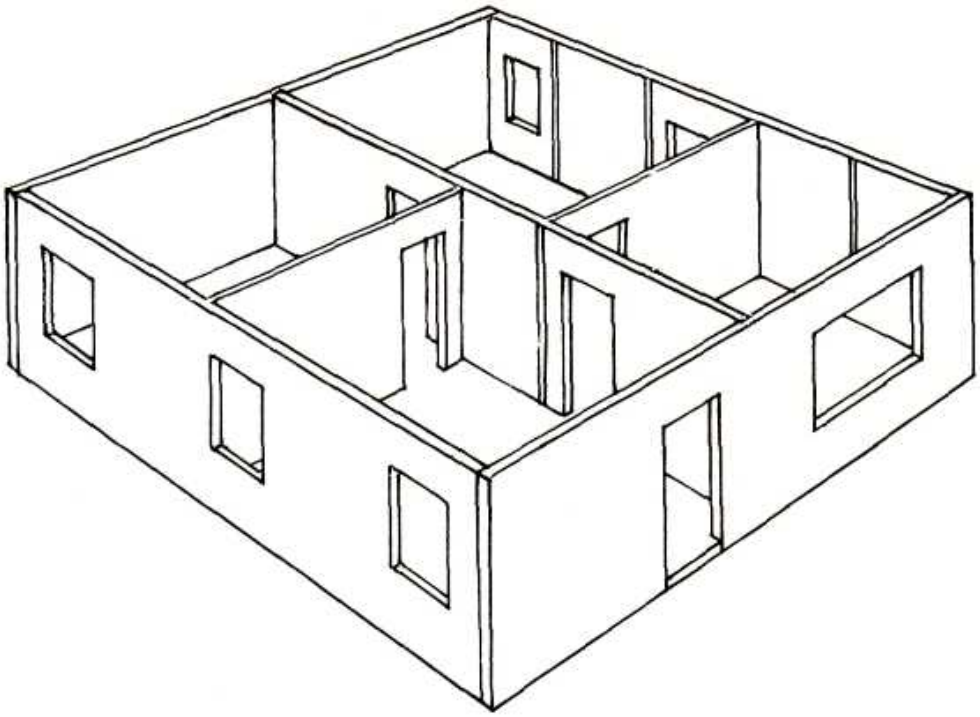
6.3 DOLL HOUSE

This is the Number One project on the list of any child who loves tiny places with secret corners—and what child doesn't! This design, though not as architecturally elaborate as some, will provide an endless amount of fun and fascination for children. Scaled for use of plastic furniture readily available in dime stores.



List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length		
A	1	front	½	8½	22
B	1	side	½	8½	21½
C	1	back	½	8½	22
D	1	side	½	8½	21½
E	1	bottom	½	21½	21½
F	1	partition	½	8	21½
G	2	partitions	¼	8	10½

Instructions for Assembly

1. Join bottom (E) to side (B) and side (D).
2. Fasten front (A) and back (C).
3. Install partitions (F) and (G).
4. Apply finish.

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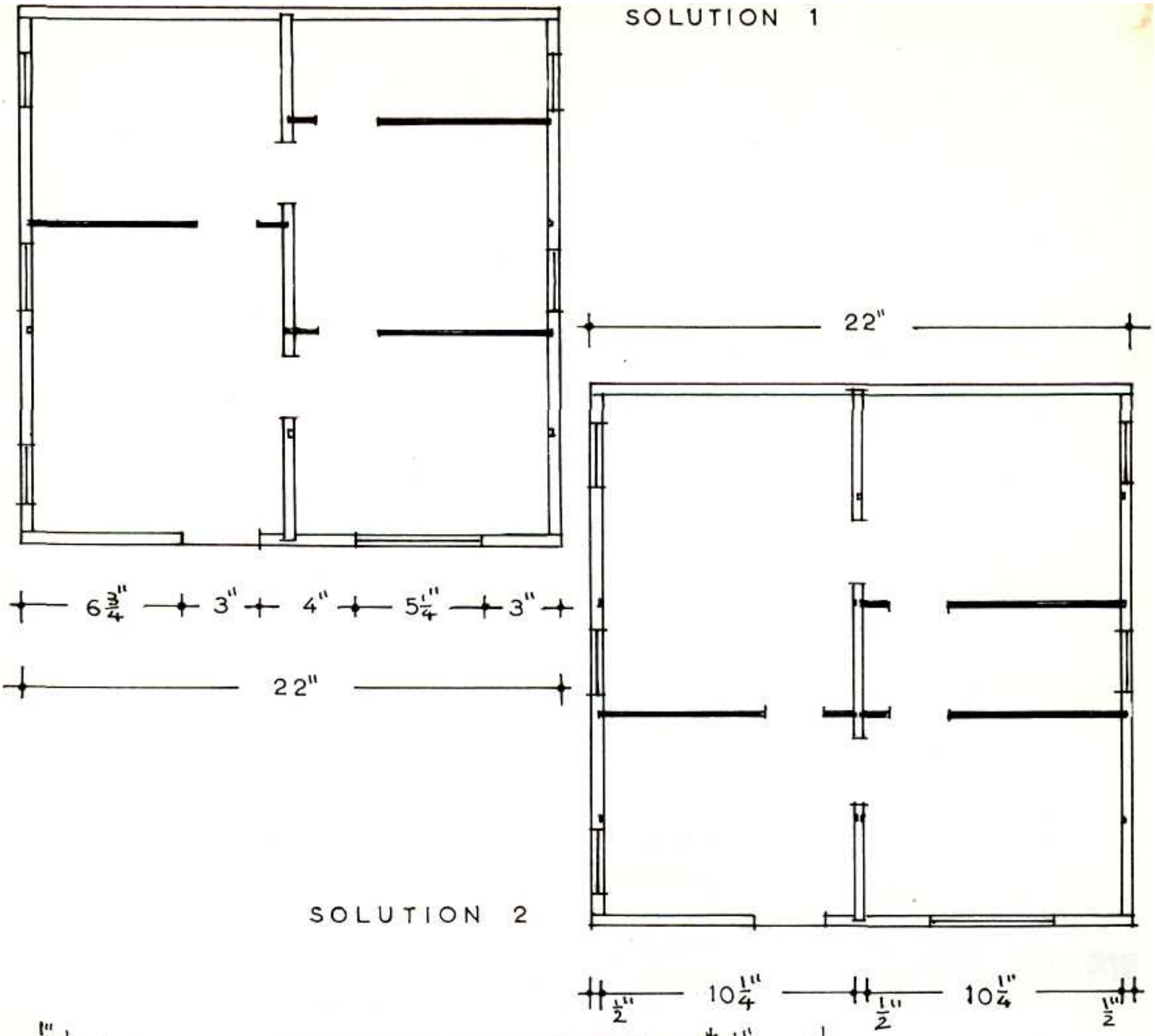
SOLUTION 1



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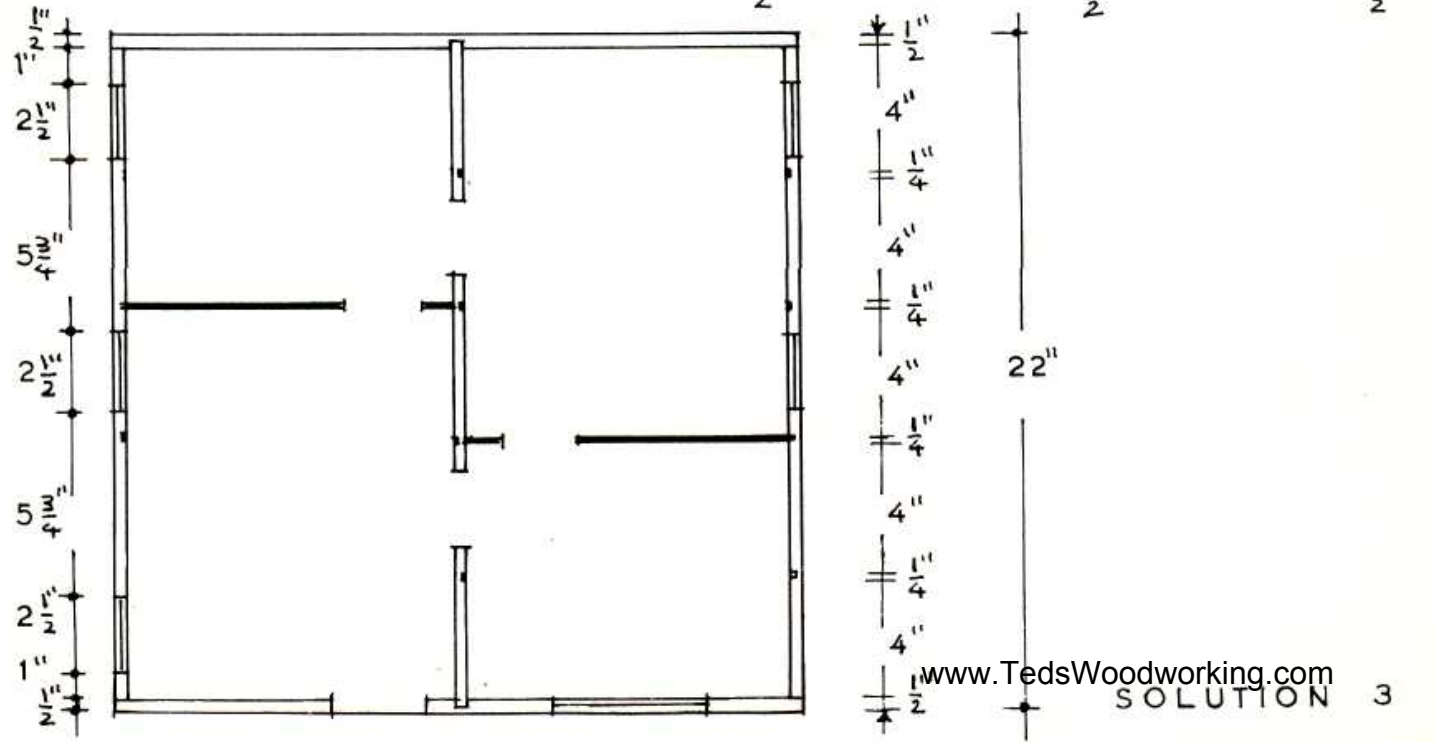

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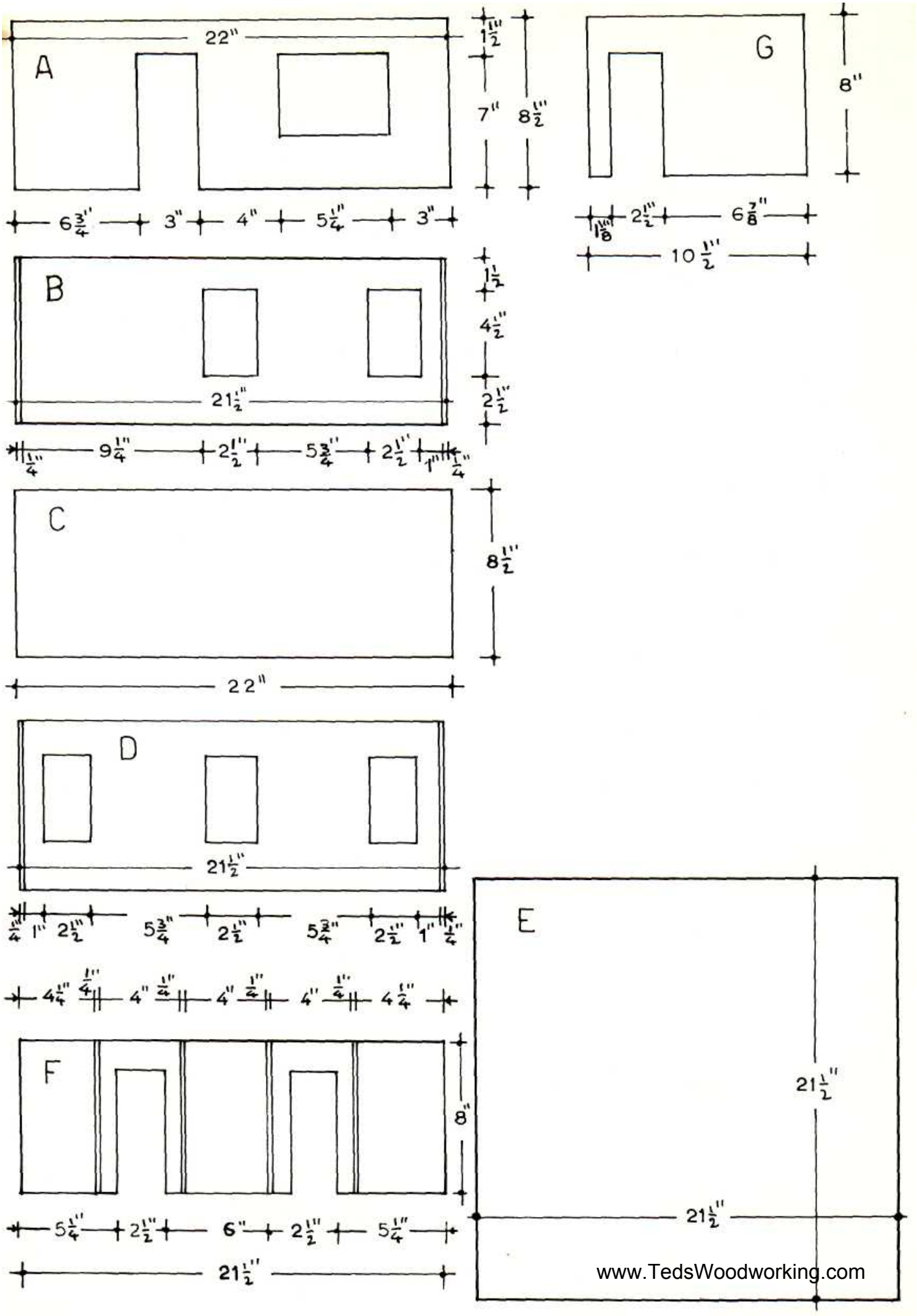
SOLUTION 3



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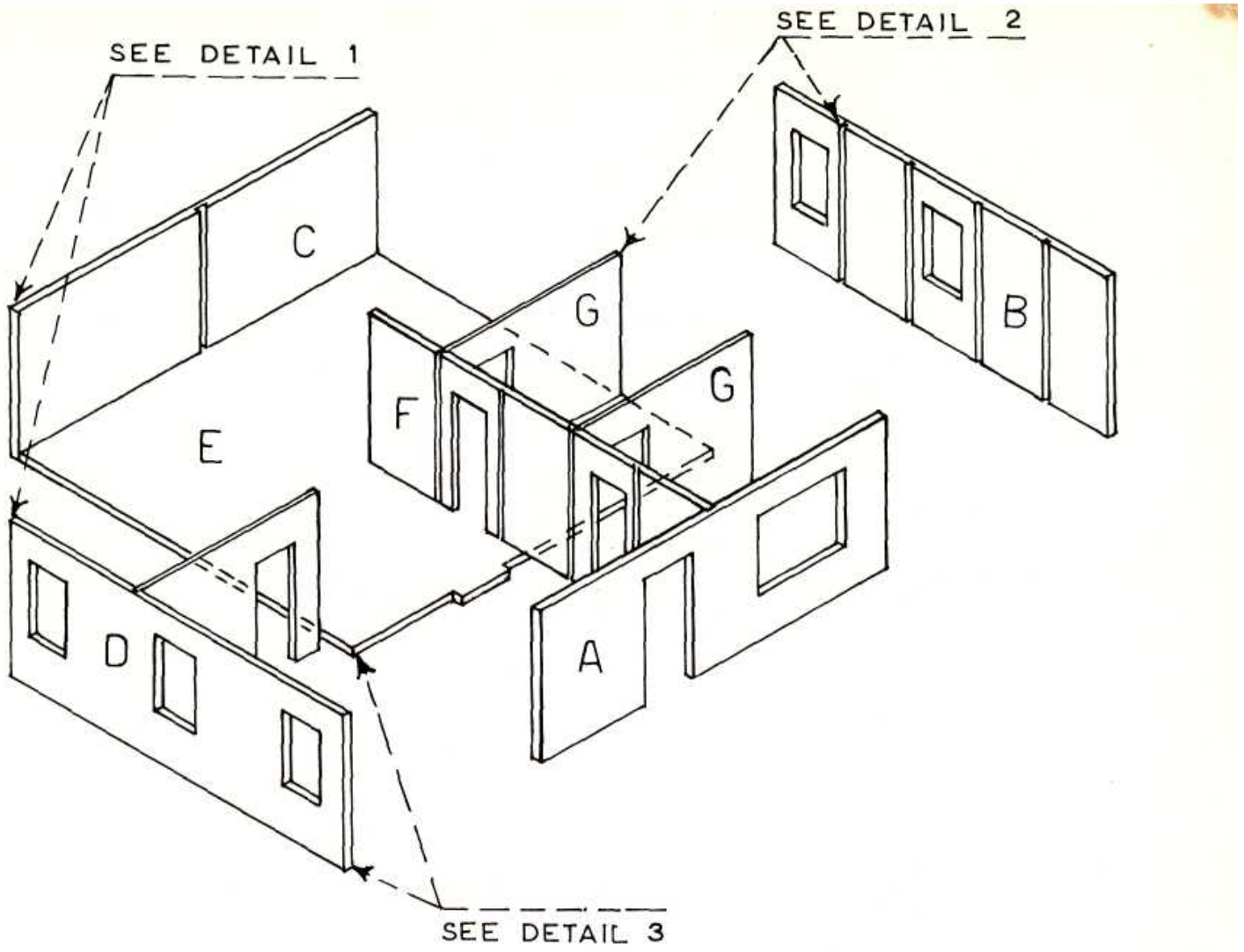
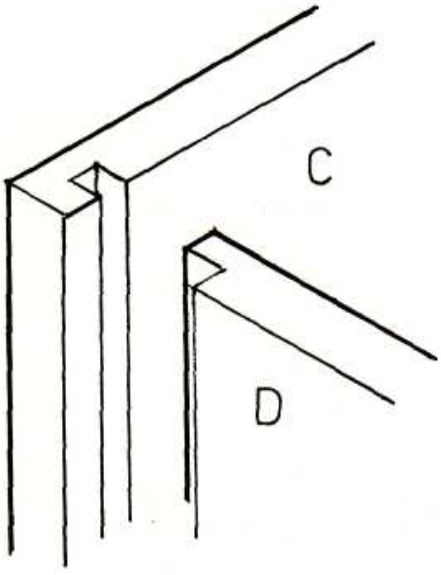
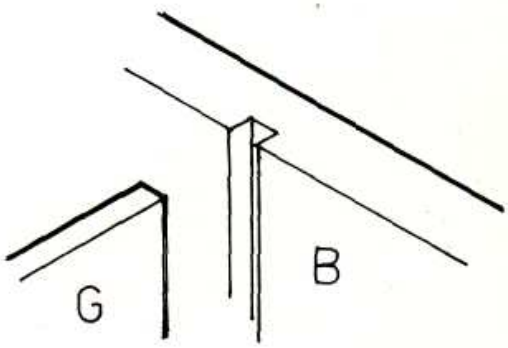




DETAIL 1



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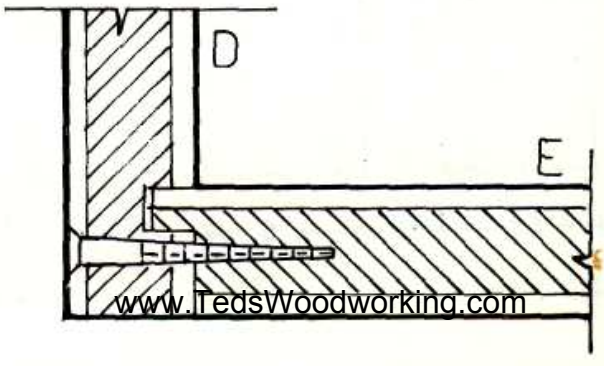

DETAIL 3

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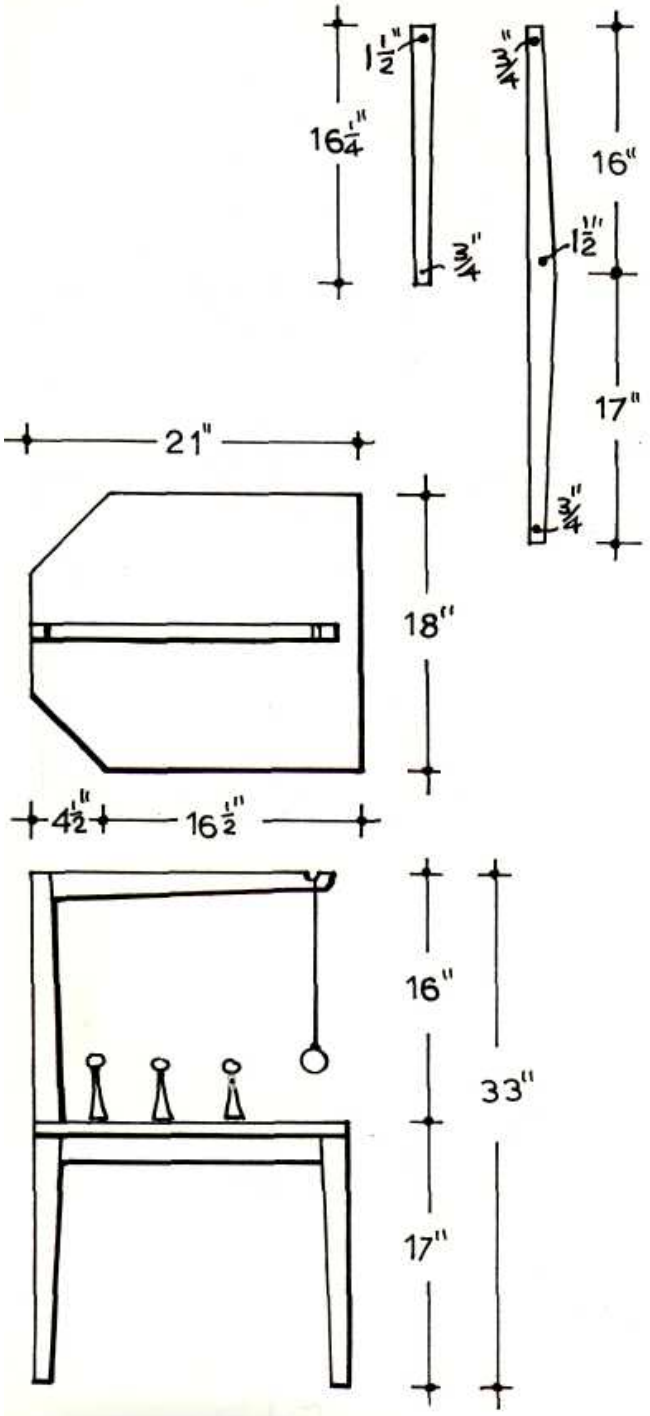
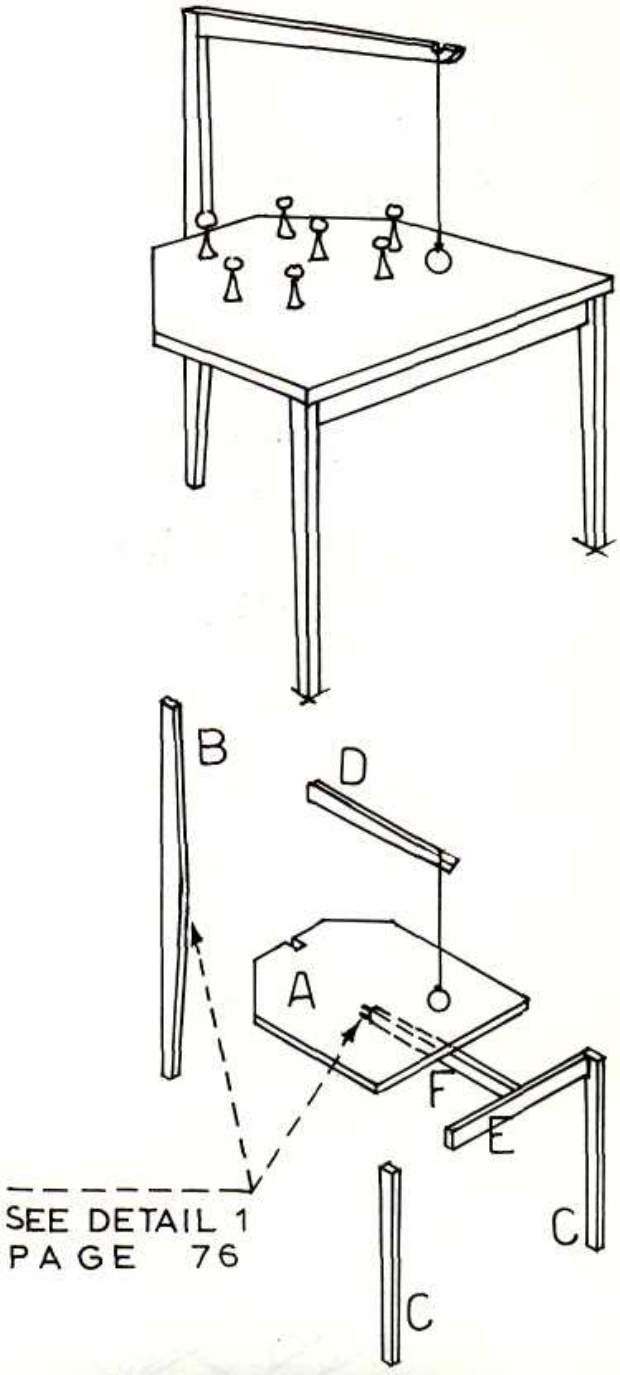
6.4 PLAY TABLE

A practical and enjoyable present for your child, and especially useful when the weather is bad and the child has to play inside.





List of Materials

A	1	top	¾	18	21
B	1	leg	1	1½	33
C	2	legs	1	1½	16¼
D	1	rail	1	1½	18
E	1	rail	1	1½	15½
F	1	rail	1	1½	18

Instructions for Assembly

1. Join rail (E) to legs (C), and rail (F) to rail (E) and leg (B).
2. Fasten rail (D) to leg (B), and attach top (A) to rails (E, F).
3. Apply finish.

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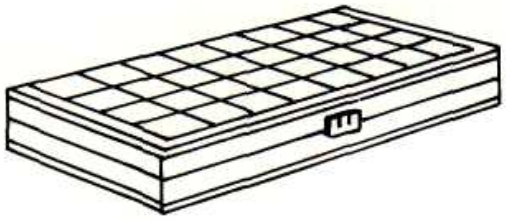
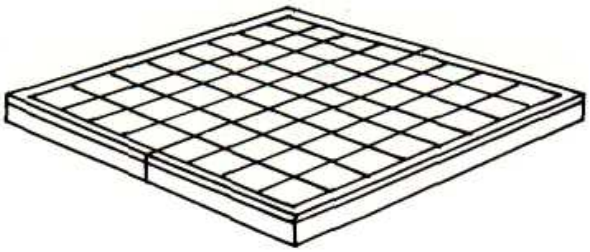
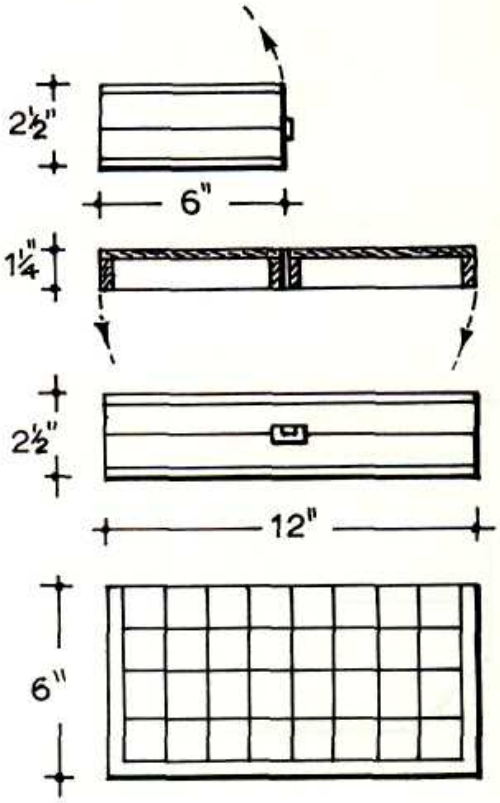
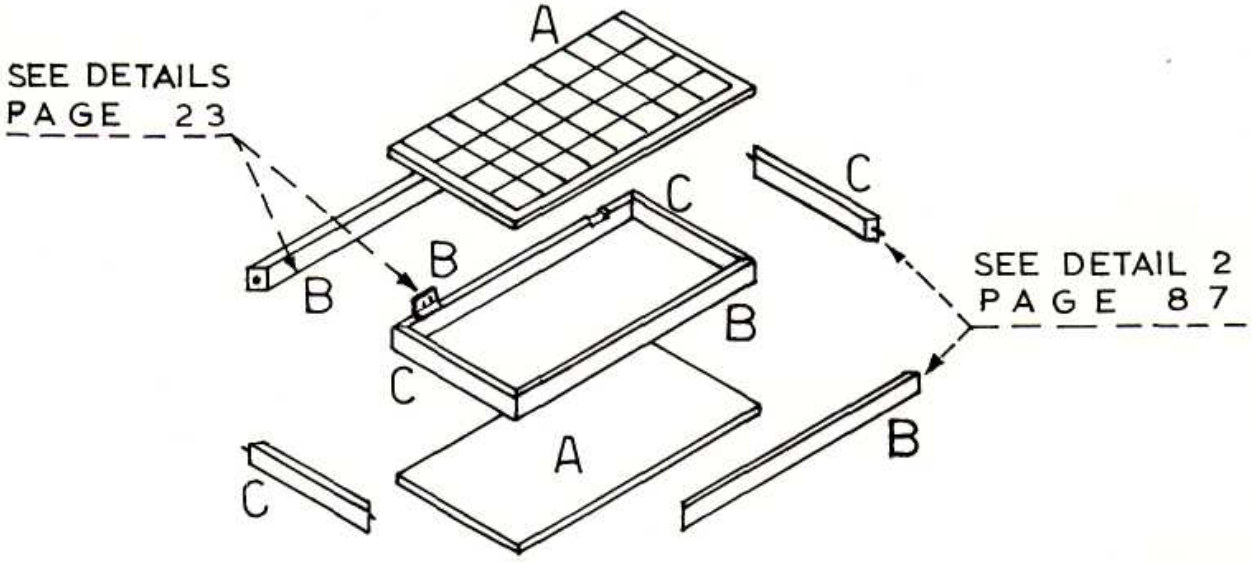
6.5 CHECKER BOX

The hobbyist will enjoy playing a favorite game on a checker box that is personally made.









List of Materials

A	2	tops	¼	6	12
B	4	rails	½	1	12
C	4	rails	½	1	6

Instructions for Assembly

1. Join rails (B) with rails (C).
2. Attach tops (A), and install hinges to rails (B).
3. Apply finish.

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6.6 LEG EXERCISER

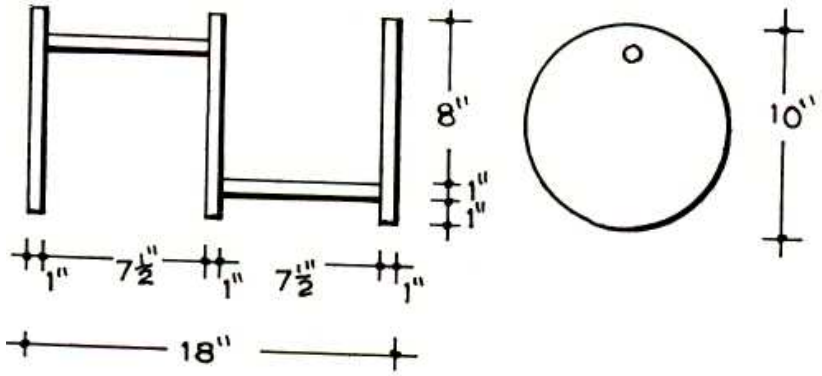
Your children can have fun and at the same time strengthen their leg muscles with this clever device. Easy to make, it requires very little time as well.

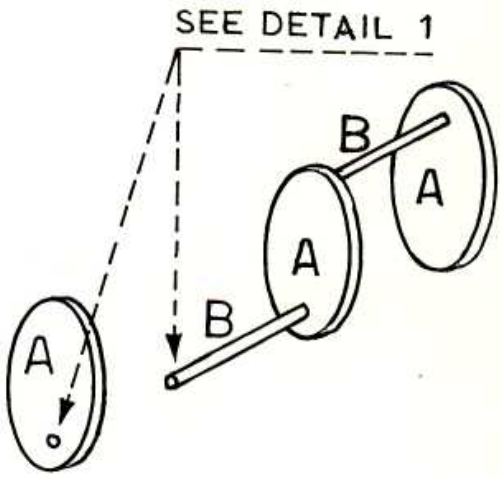
List of Materials

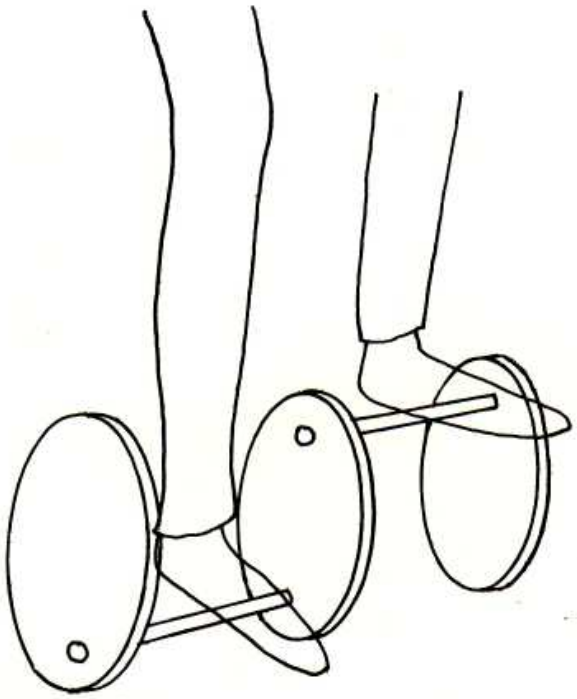
A	3	boards	¾	10 diam.
B	2	dowels	1 diam.	8½

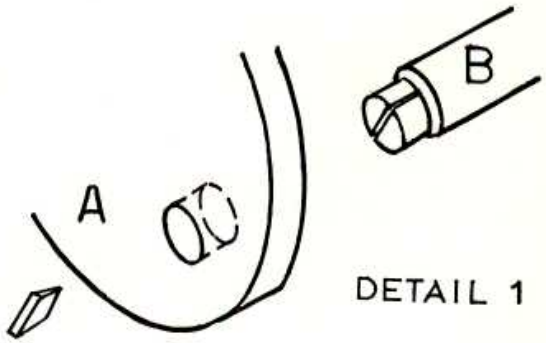
Instructions for Assembly

1. Join (A) with (B).
2. Apply finish.









DETAIL 1

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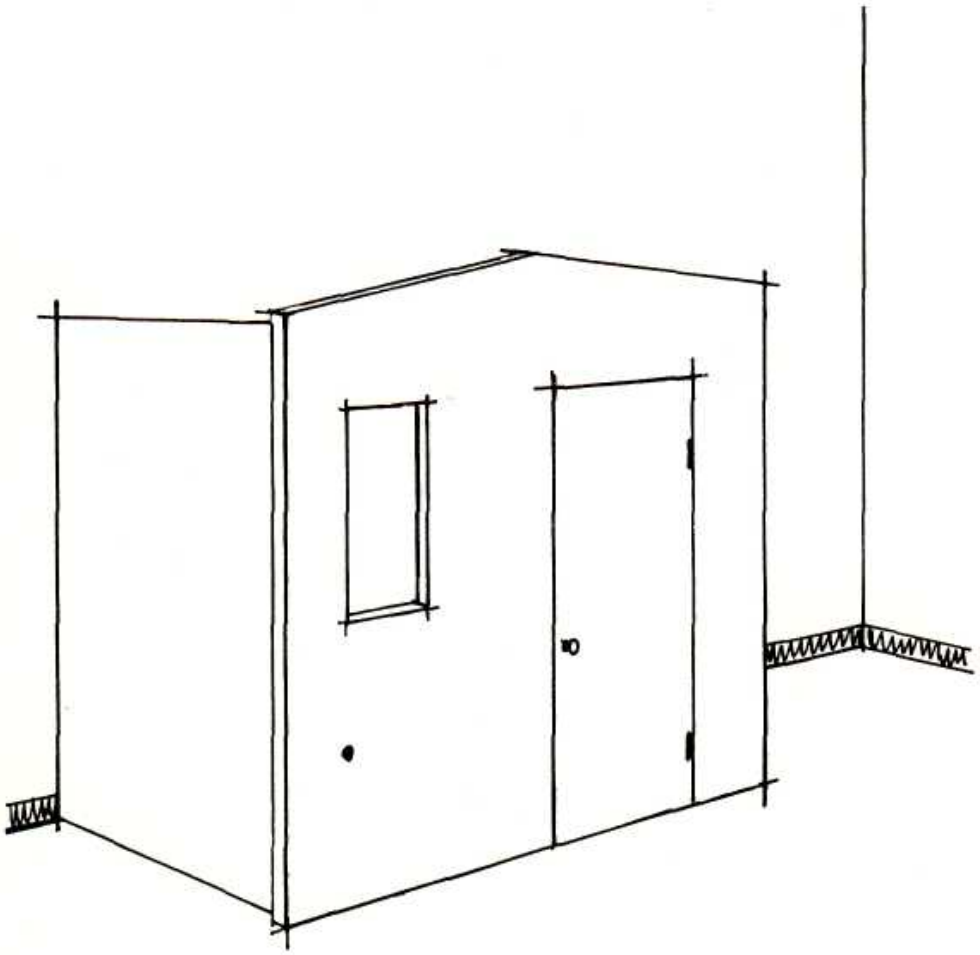
6.7 FOLDING PLAYHOUSE

This three-sided, folding, roofless structure may not look like a castle, a firehouse, or a general store, but that's because we left out the principal ingredient—the child's gift of imagination. If used outdoors (against the side of the house) it should be painted.



List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness	× width	× length
A	1	front panel	¾	60	60
B	2	sides	¾	27	55
C	1	door	¾	18	46
D	1	strip	½	1¼	60

Instructions for Assembly

1. Join sides (B) to front (A).
2. Fasten strip (D) to front (A).
3. Install door.
4. Apply finish.

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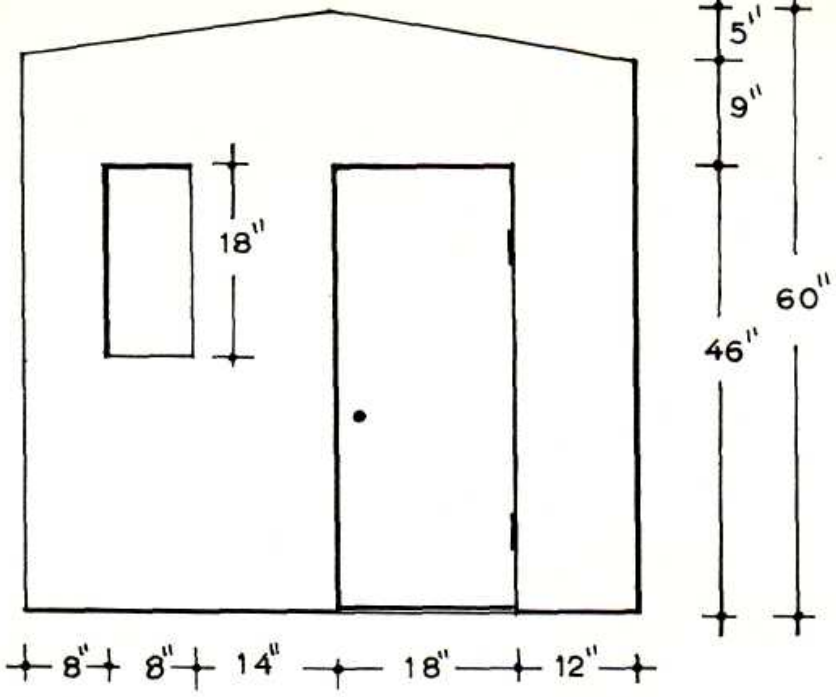

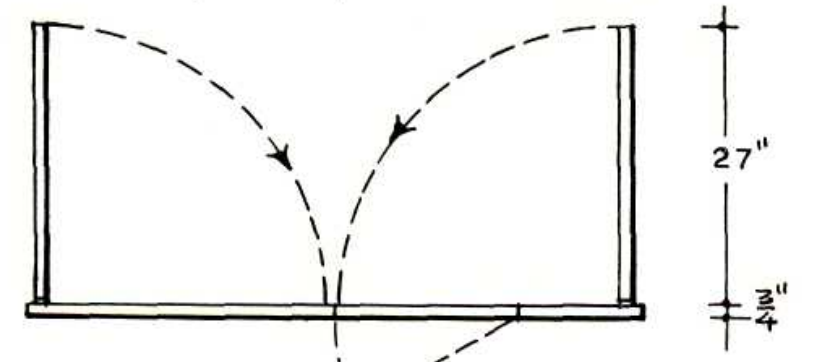

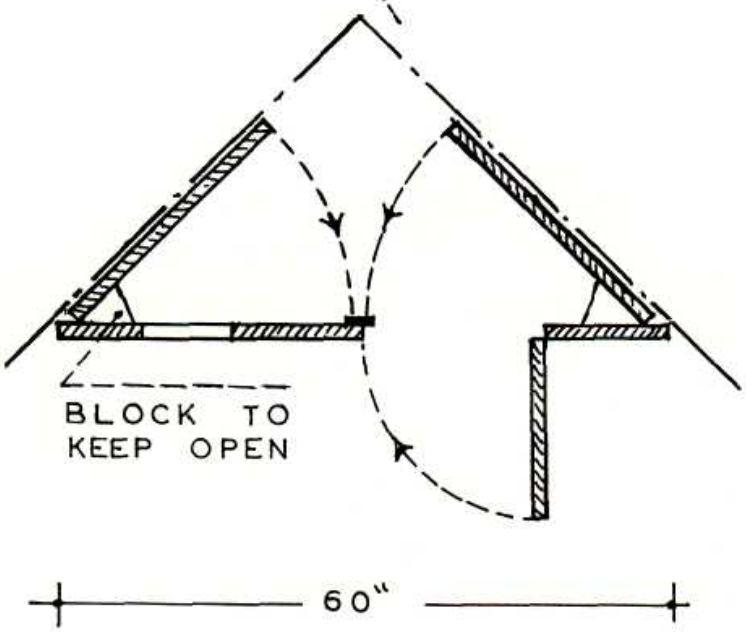

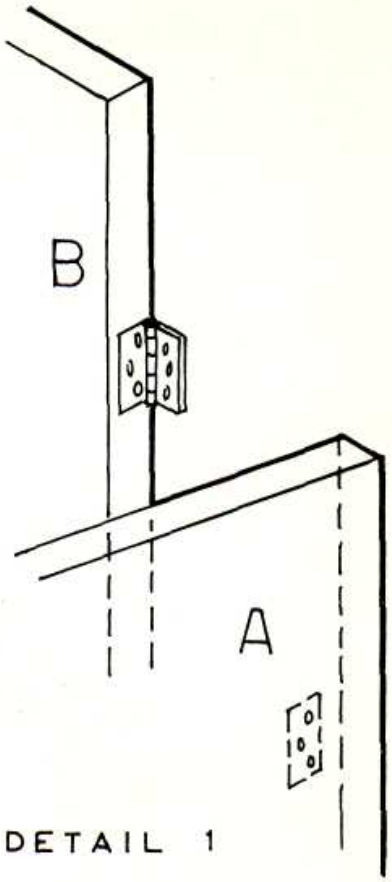

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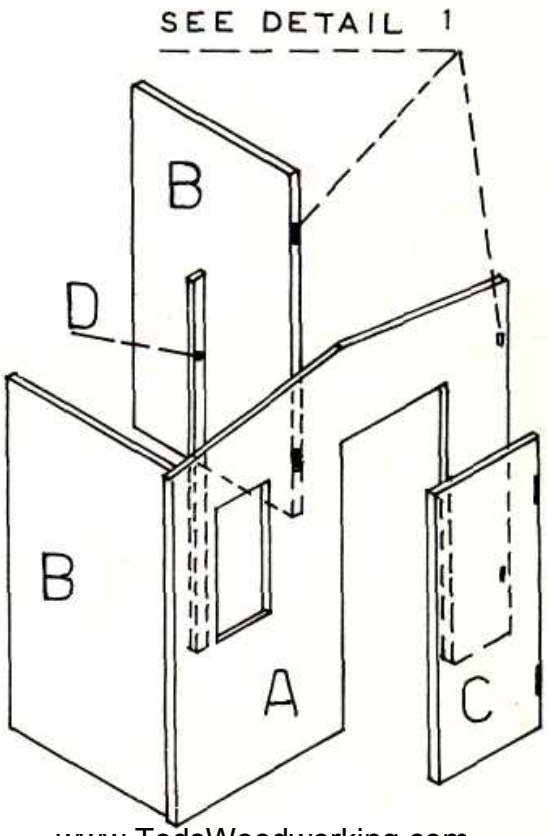

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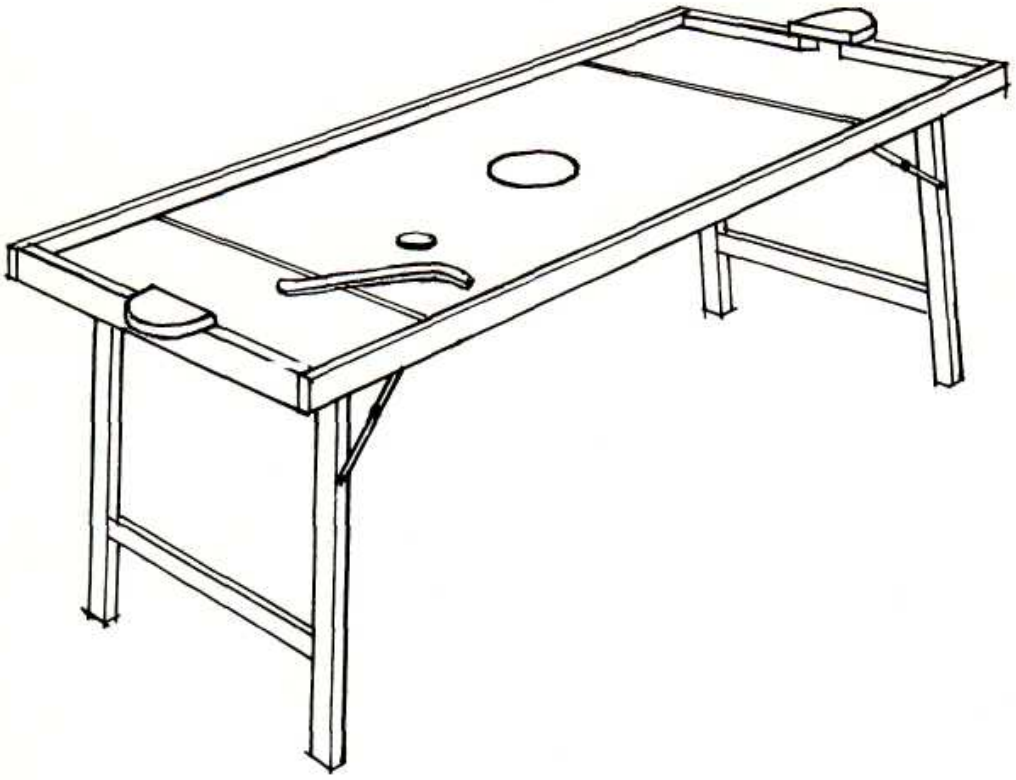
6.8 HOCKEY TABLE

Hours of fun—and training in eye-hand coordination—are afforded by this simple table-top version of hockey. A children's game that can be shared by adults. A manufactured table, if at all available, would be pretty expensive, but this one takes only a little plywood and a few hours of your spare time.



List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length		
A	1	top	¾	23½	58½
B	2	strips	¾	1½	60
C	4	strips	¾	1½	10¾
D	4	corner blocks	¾	2	2
E	4	legs	¾	2	26
F	4	rails	¾	2	17
G	2	covers	¾	5	3½
H	4	folding metal supports			

Instructions for Assembly

1. Attach strips (B) and (C) to top (A) and install corner block (D).
2. Fasten covers (G) on strips (C).
3. Join legs (E) to rails (F).
4. Fasten legs (E) to top (A) and install metal supports (H).
5. Apply finish.

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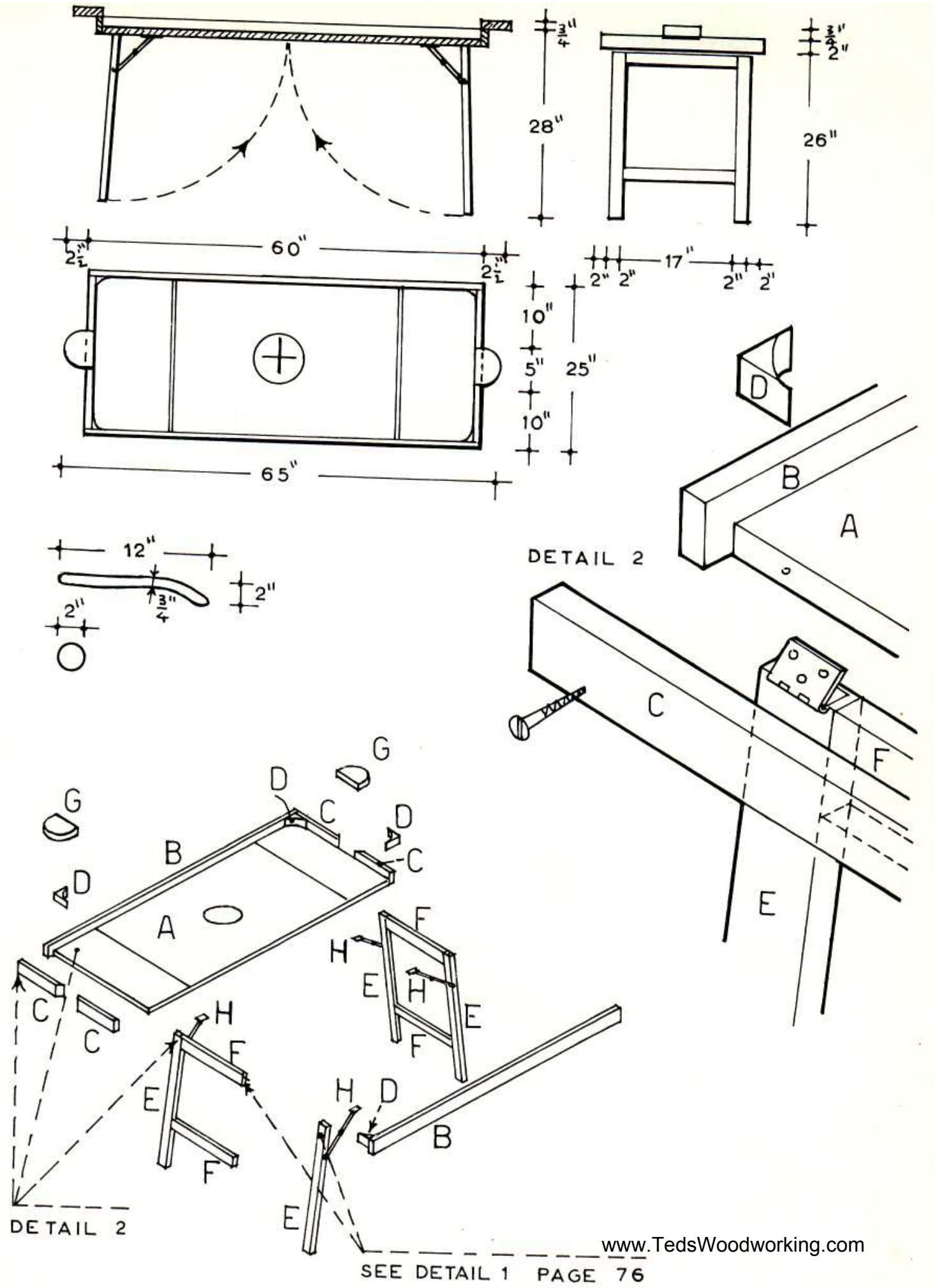

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6.9 PING PONG TABLE

"Ping Pong" is actually a trademark or trade name for a special make of tennis table, but it has become so much of a household word that our use of it here can be excused. This is another family item which Dad and Mom will enjoy as much as the children. Construction is no problem—top of plywood, legs of solid wood, and a net-and-clamp set (from the local sports store), presto! You're ready for the first serve.

List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length		
A	2	tops	¾	48	48
B	4	rails	1	2	29
C	8	legs	1	1¼	43
D	4	stretchers	¾ diam.		32 (approx.)
E	2	metal clamps			
F	1	net (5 in. high)			

Instructions for Assembly

1. Join tops (A) with hinges at center.
2. Attach legs (C) with bolts at center.
3. Fasten rail (B) with stretchers (D) to legs (C).
4. Join legs (C) to top (A).
5. Install clamps (E) on top (A), and string net taut.
6. Apply finish.

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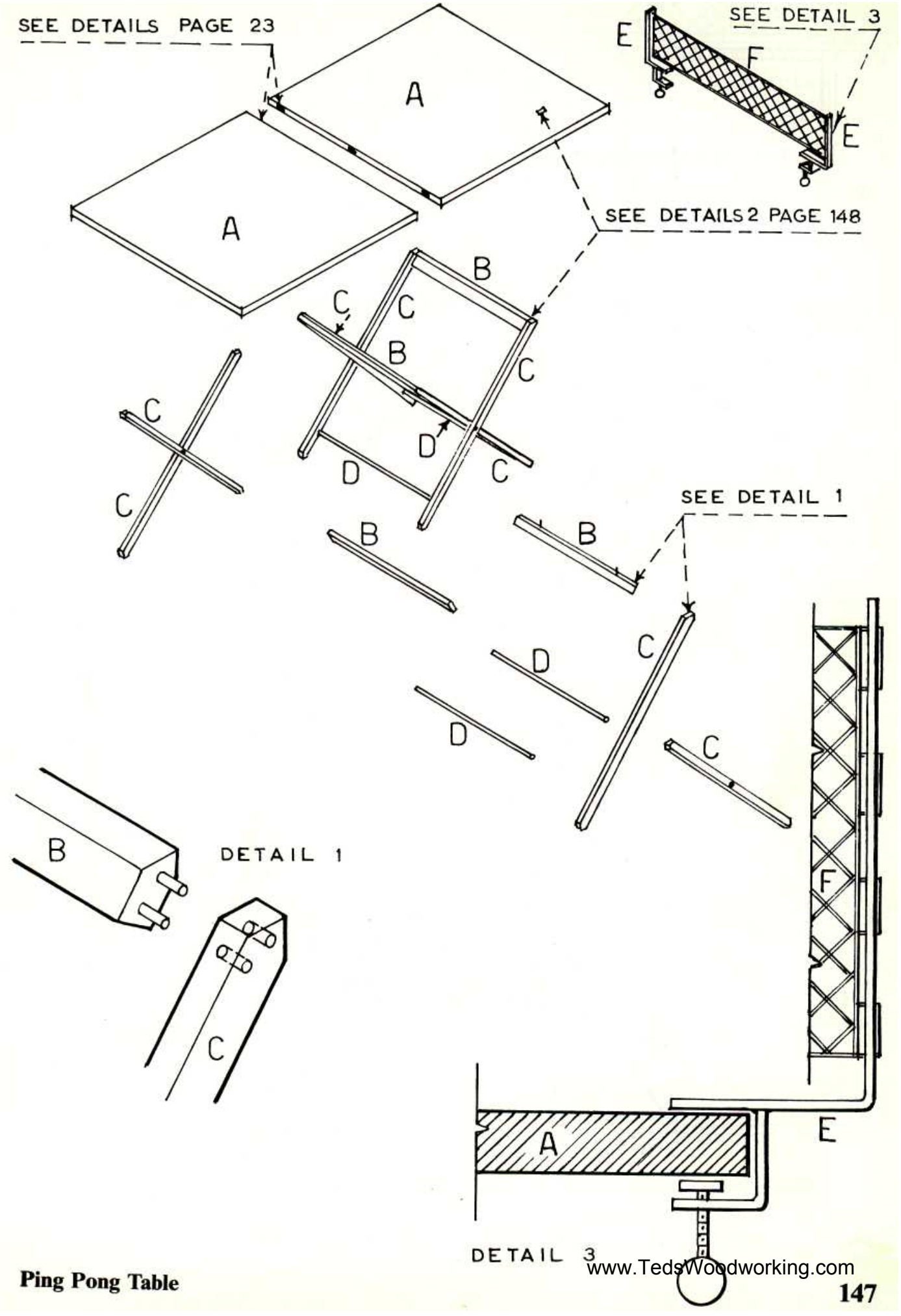

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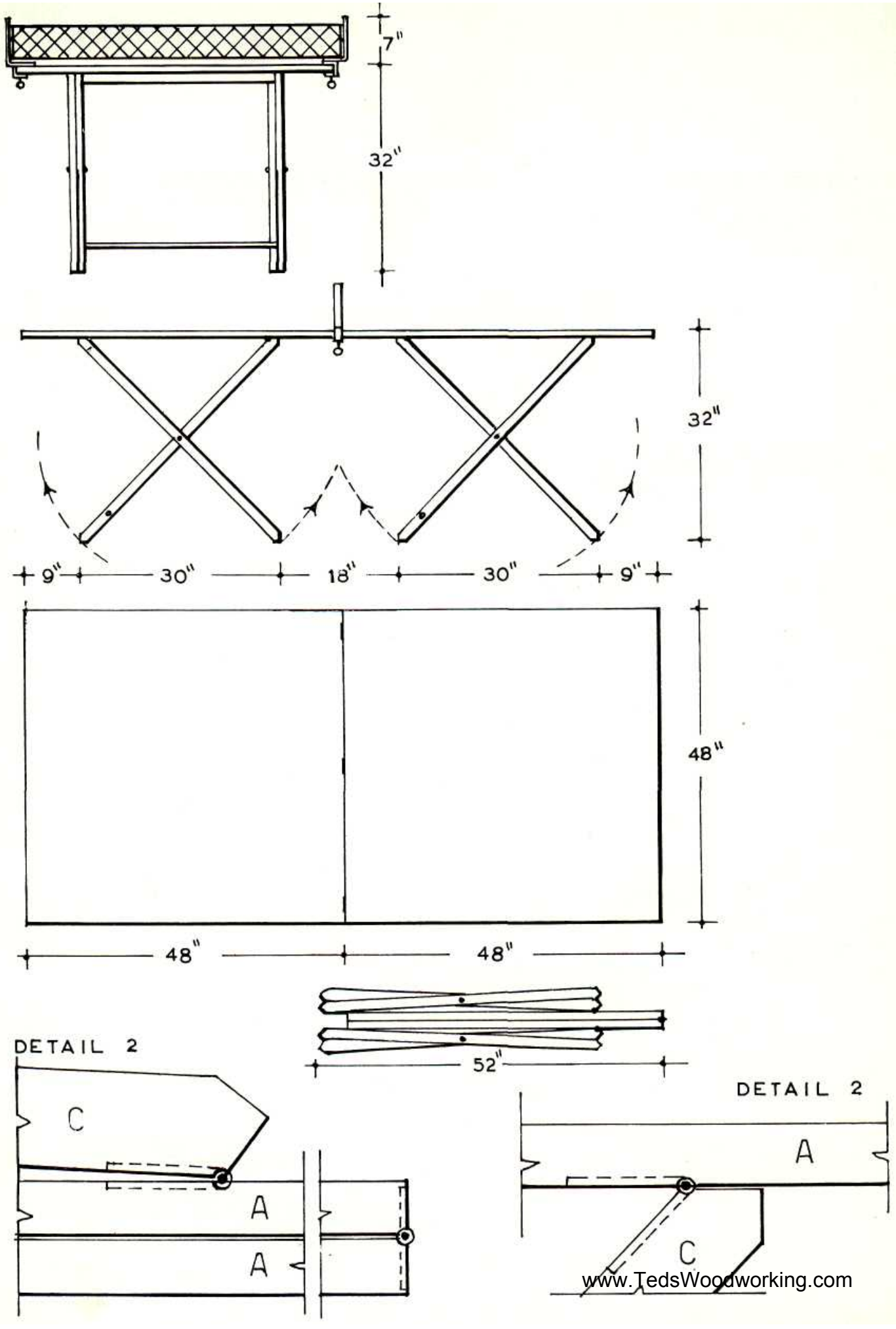

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6.10 PUPPET THEATER

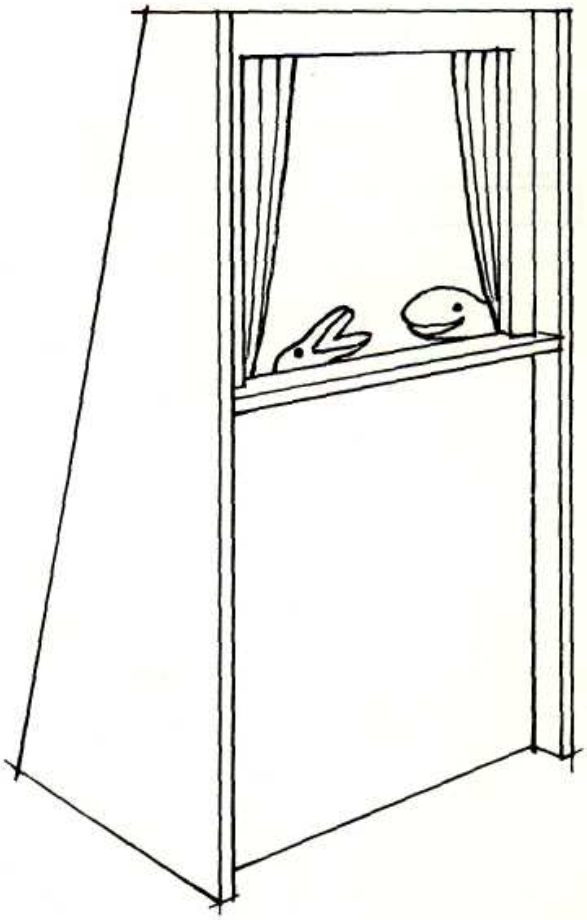
Punch and Judy, Kukla and Ollie, Lambchops and Charlie Horse will come to life in this child-size puppet theater, a training ground for the Burr Tillstroms and Shari Lewises of tomorrow. It just isn't fair to children *not* to build this plywood proscenium.

List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length		
A	1	front panel	¾	28½	53
B	2	sides	¾	17	53
C	1	board	¾	2¾	28½

Instructions for Assembly

1. Join board (C) with front panel (A).
2. Install sides (B) by joining to front (A) with hinges.
3. Apply finish.



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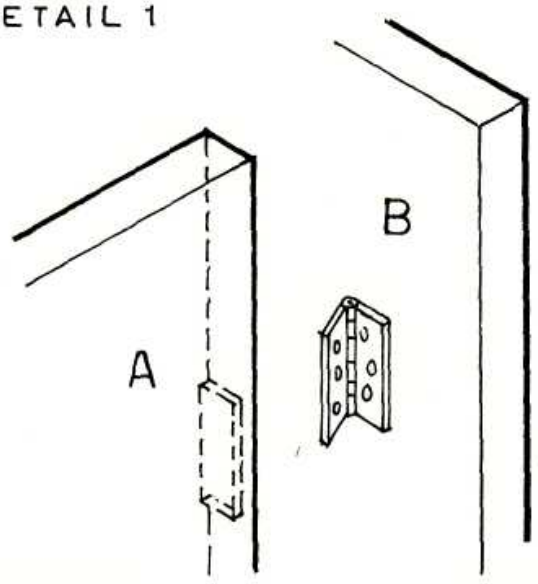

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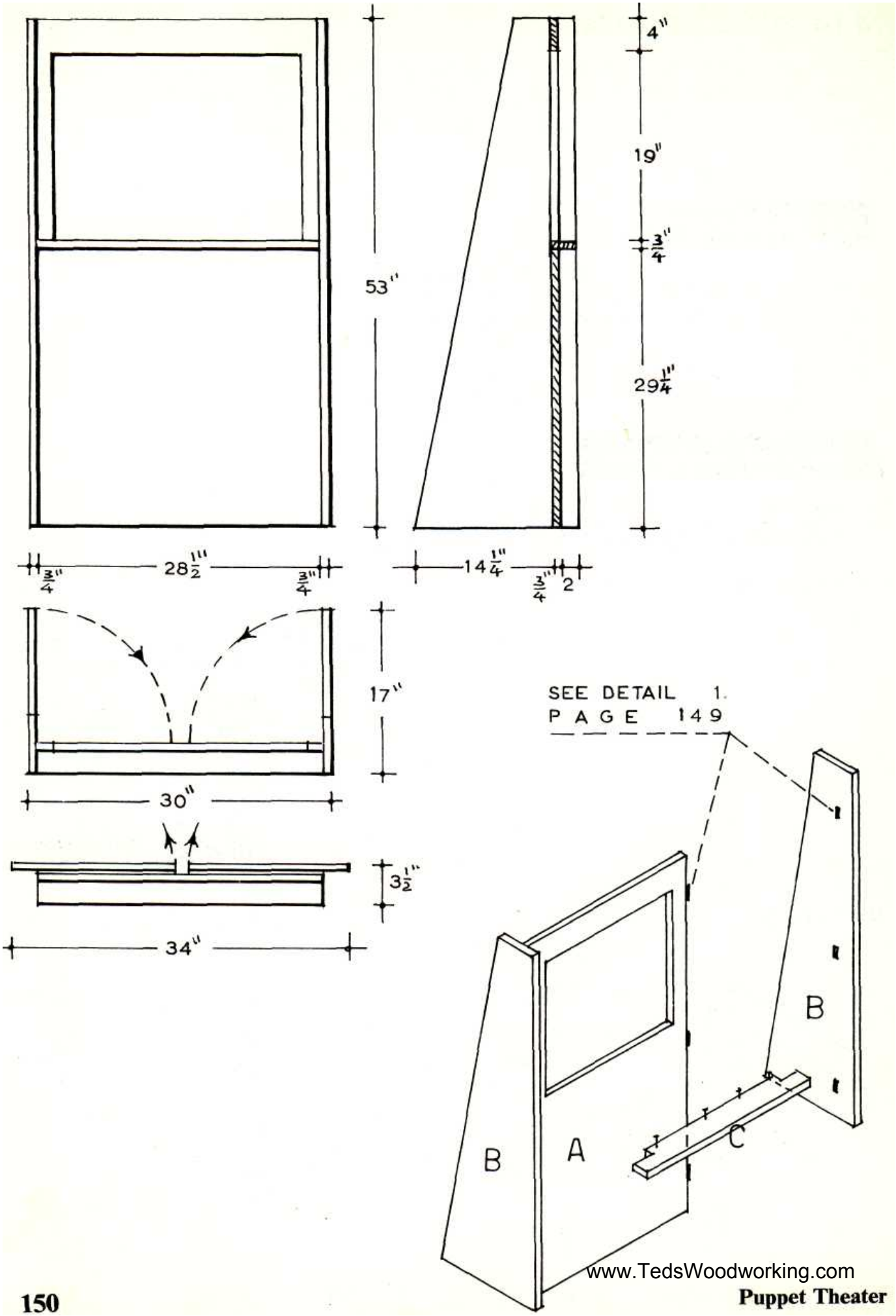

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6.11 INDOOR-OUTDOOR SLIDE

Sturdy, exciting but safe for the toddler; the drop is only a foot and a half but the three-year-old will be thrilled. The slide is removable for easy carrying in and out of the house. Plenty of muscle-building activity indoors on rainy days with this low-cost equipment.

List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness	×	width	×	length
A	4	supports	1½		1½		36
B	2	rails	1¼		1¾		17
C	4	dowels	1 diam.				20
D	1	rail	1¼		1¾		16
E	2	bottoms	1½		1½		36
F	2	sides	¾		3½		42
G	1	plank	¾		14½		42
H	2	side rails	1		1½		20
J	2	cross rails	1		1½		14¾
K	1	panel	¾		18½		20

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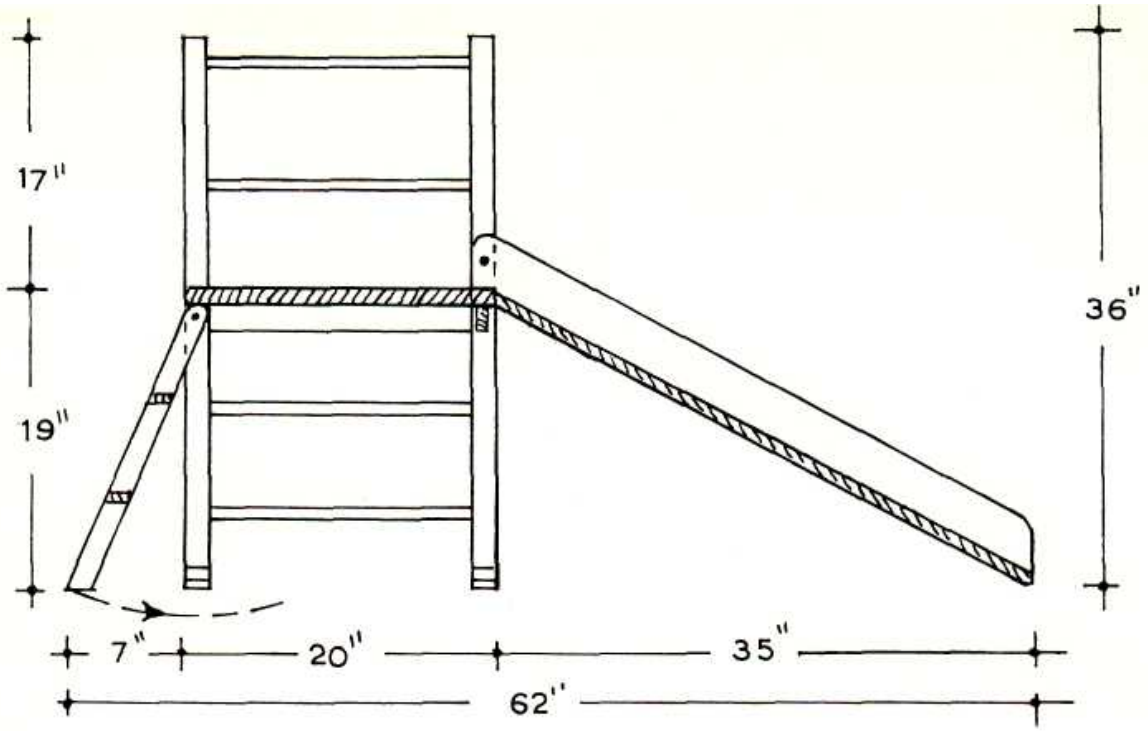

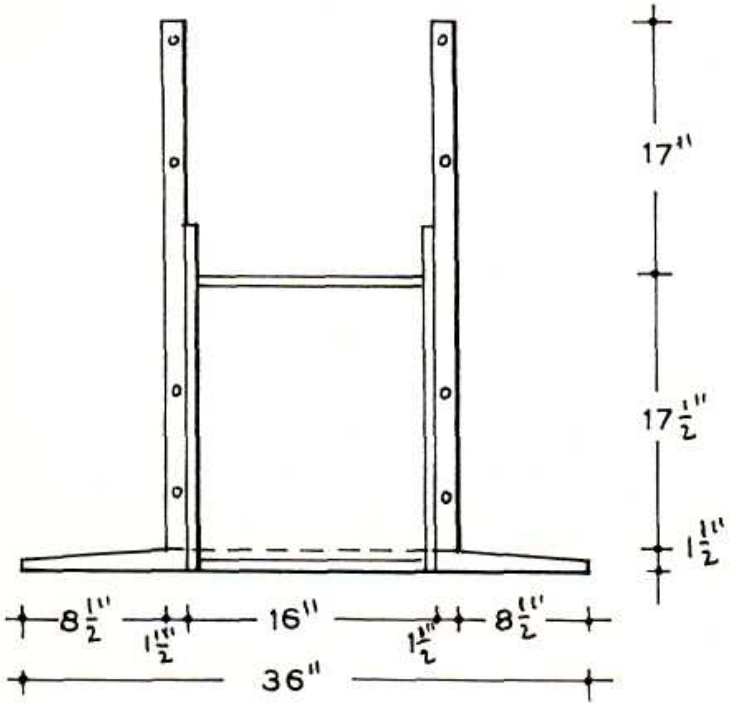

Instructions for Assembly

1. Join supports (A) to rails (B) and dowels (C).
2. Fasten supports (A) to rails (D) and (E) and attach panel (K).
3. Join sides (H) with rails (J) and attach sides (H) to (A) with screws.
4. Join sides (F) to sides (G).
5. Apply finish and install slide (F, G) by attaching to supports (A).

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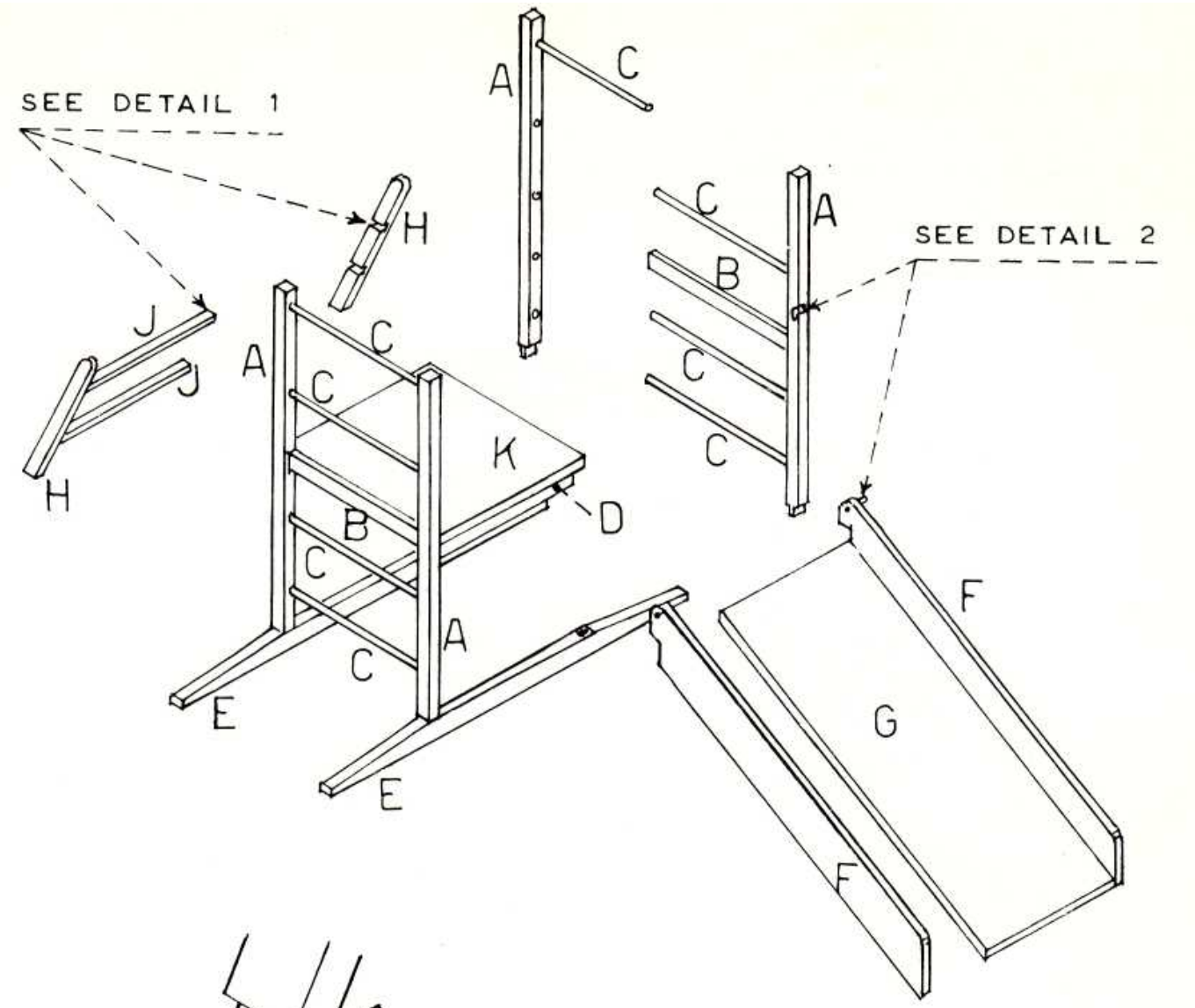

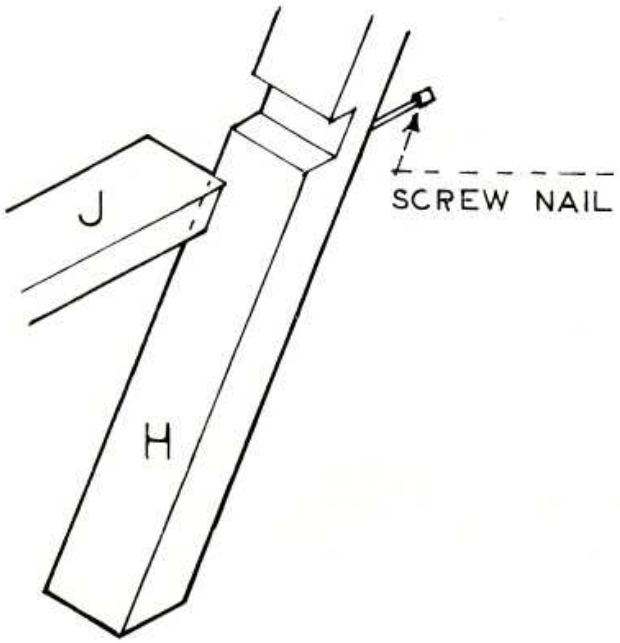

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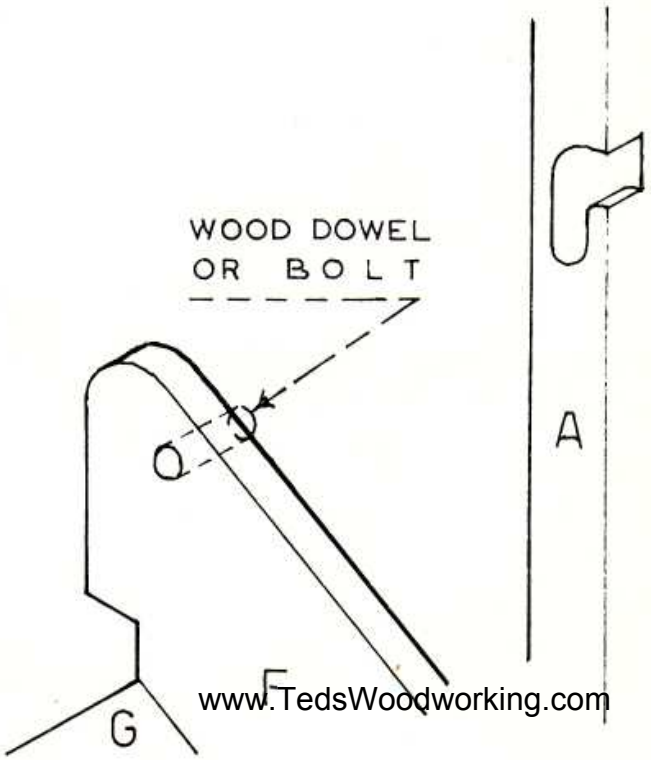

DETAIL 2

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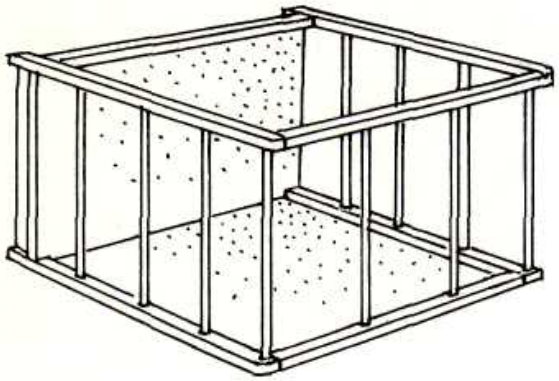
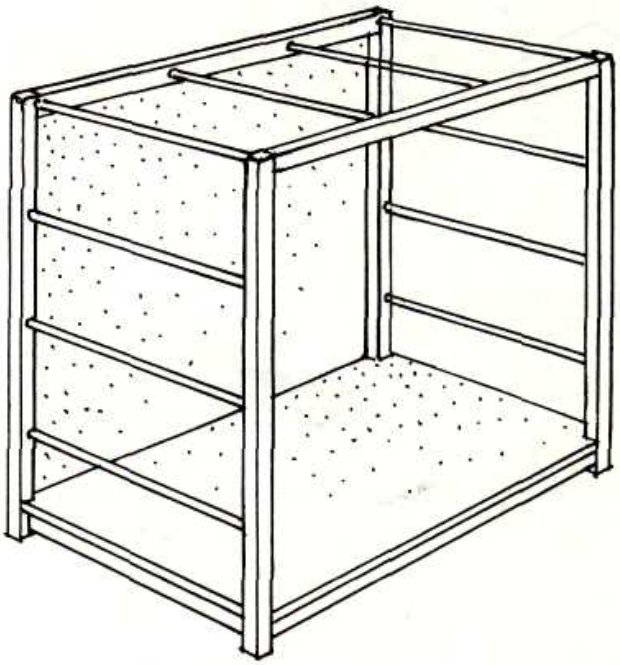
6.12 LADDER BOX

For tots of a certain age, this can be the all-purpose fun machine par excellence. Stand it upright and it's an economy-size "monkey cage" like the one in the park; lay it on its side and it's a walk-through play pen or county jail; cover it temporarily with boards or sheets and it's a tent, an igloo, a fortress, an ogre's cave.



List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length		
A	4	legs	1½	1½	48
B	2	rails	1	1½	21
C	2	rails	1½	1½	45
C	2	rails	1	1½	45
D	9	dowels	1 diam.		24
E	1	back panel	½	45	47
F	1	bottom	¾	23½	48
G	4	planks	½	5¼	48



Instructions for Assembly

1. Join legs (A) to rails (C) and (C′).
2. Fasten legs (A), rails (C, C′) and sides (B) with dowels (D).
3. Attach back (E) and bottom (F).
4. Apply finish.
5. Add planks (G) when box is used as a playhouse.

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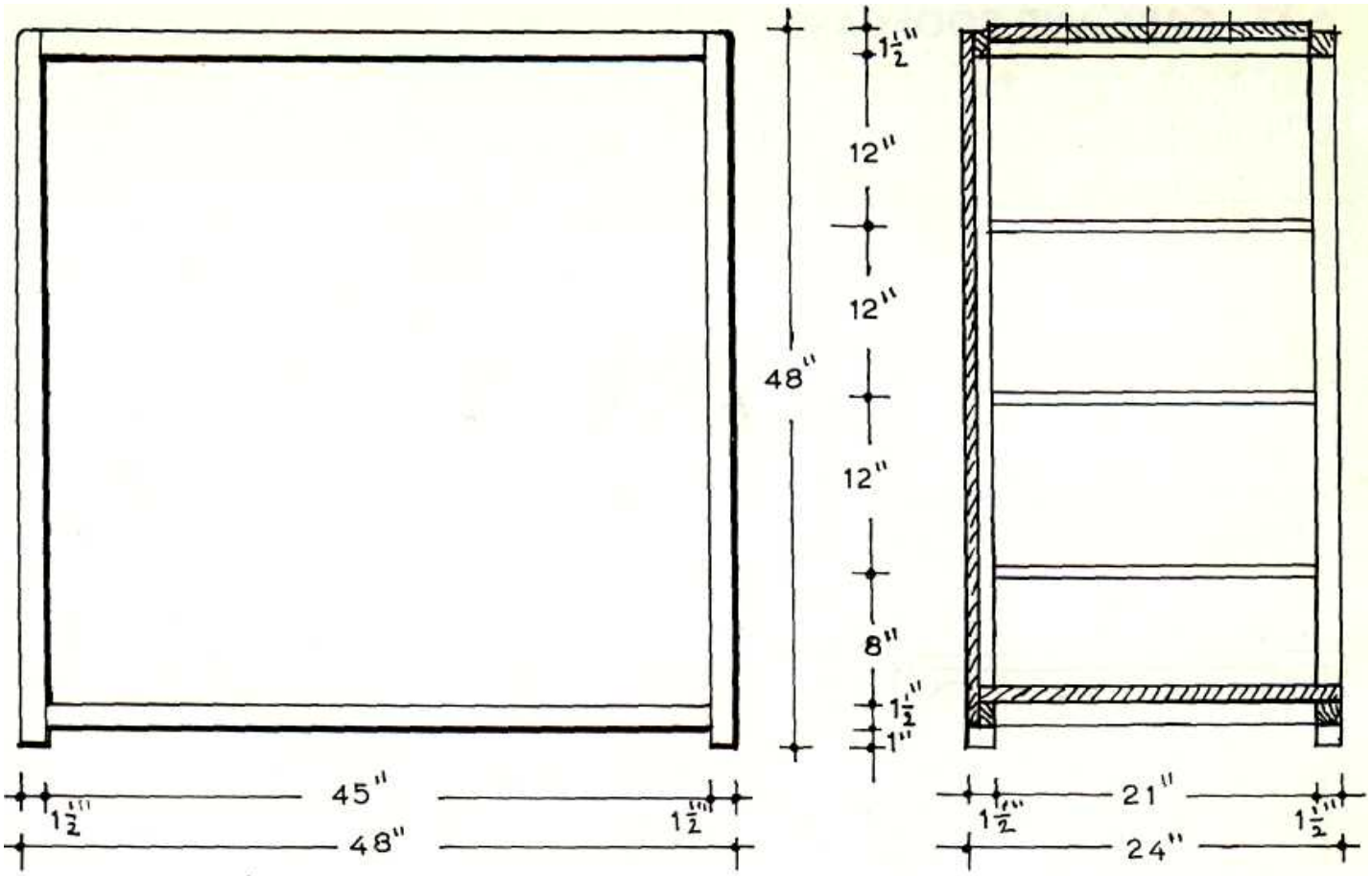

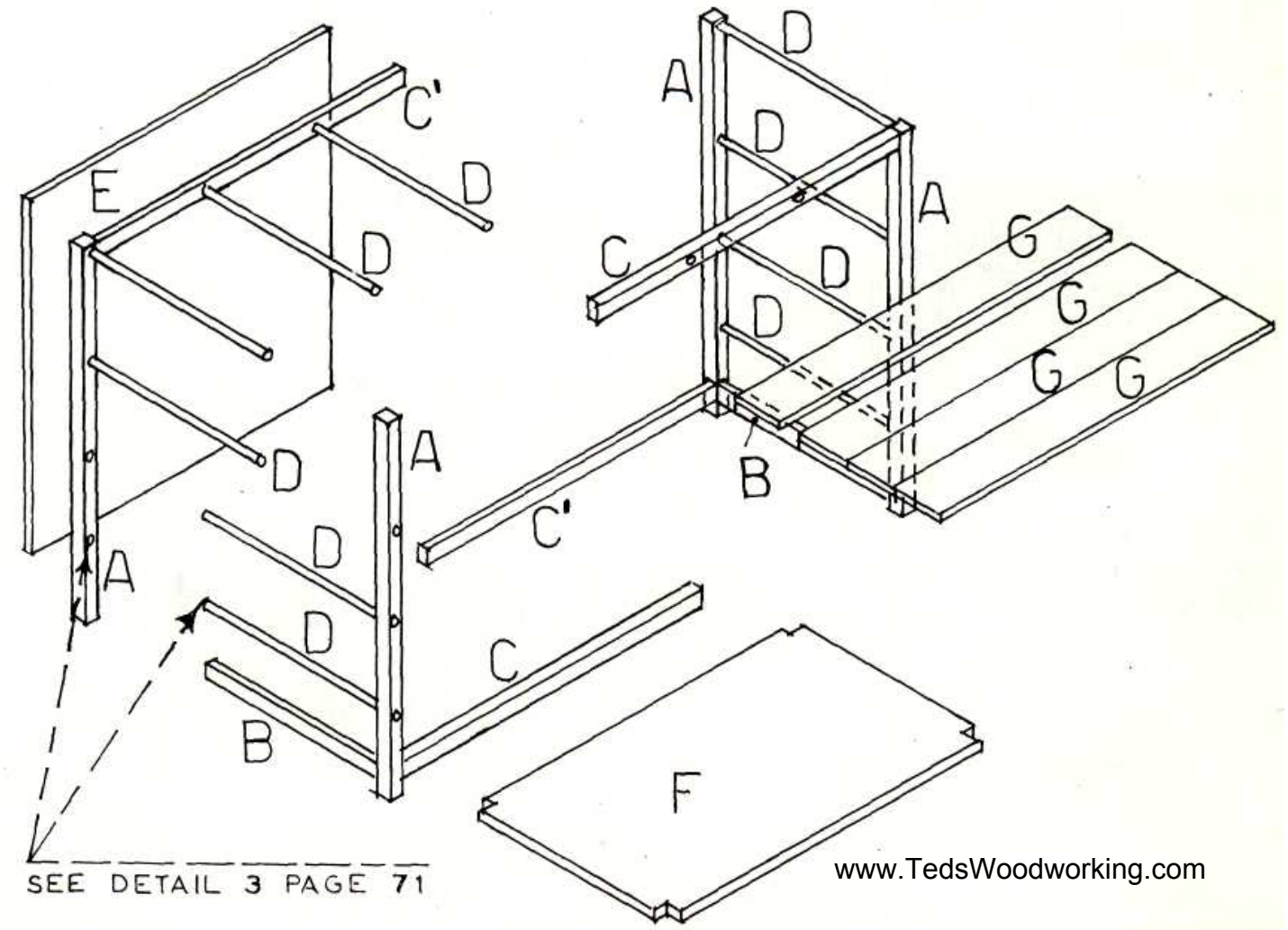

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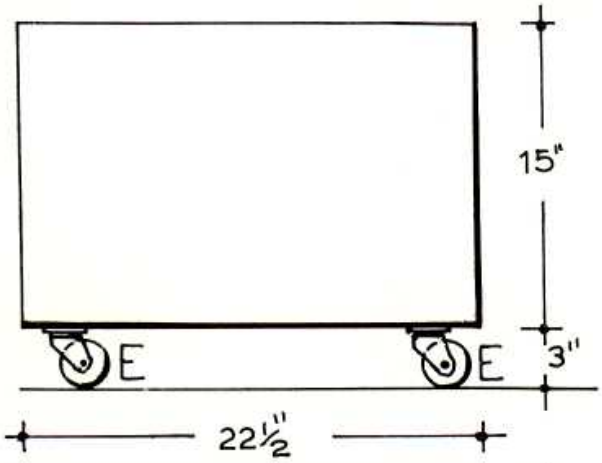
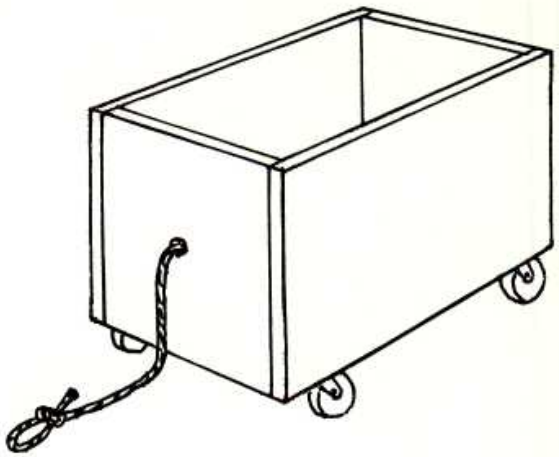
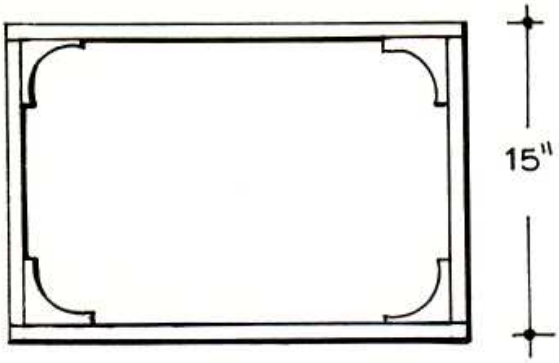
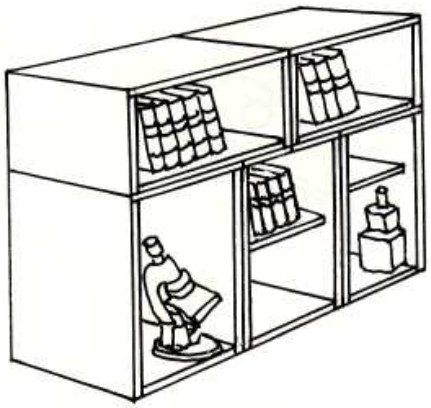
6.13 CART AND BOOKCASE

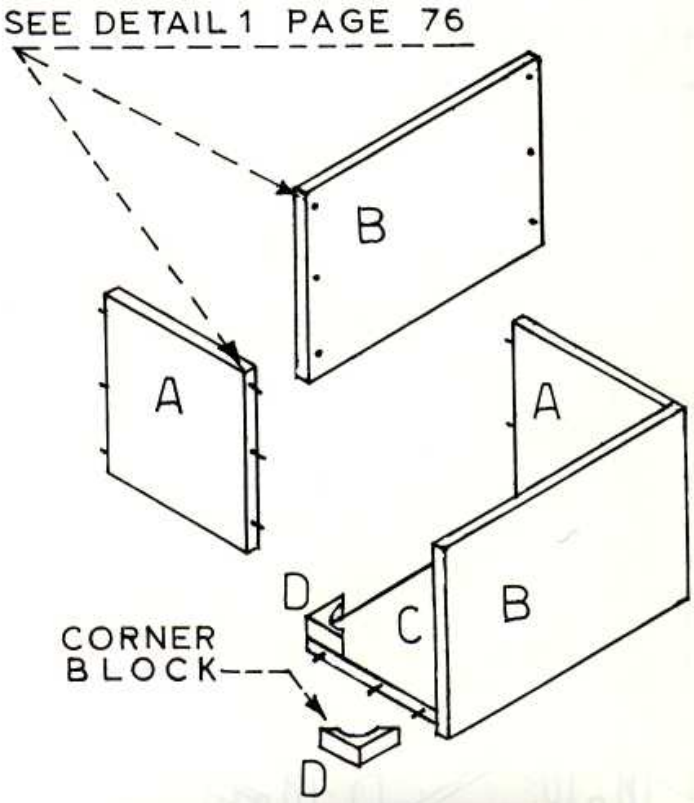
Very simple to make, this cart can be a lot of fun in a children's playroom. Make several of them, join them together, and you have a modular bookcase.











List of Materials

A	2	sides	¾	15	13½
B	2	fronts	¾	15	22½
C	1	bottom	¾	13½	21
D	4	corner blocks	¾	3	3

For cart, add 4 casters and about 3 ft. of rope.

Instructions for Assembly

1. Join sides (A) to bottom (C); then front (B) to bottom (C) and sides (A).
2. Attach corner blocks (D).
3. Apply finish.
4. To use as cart, attach casters and rope.

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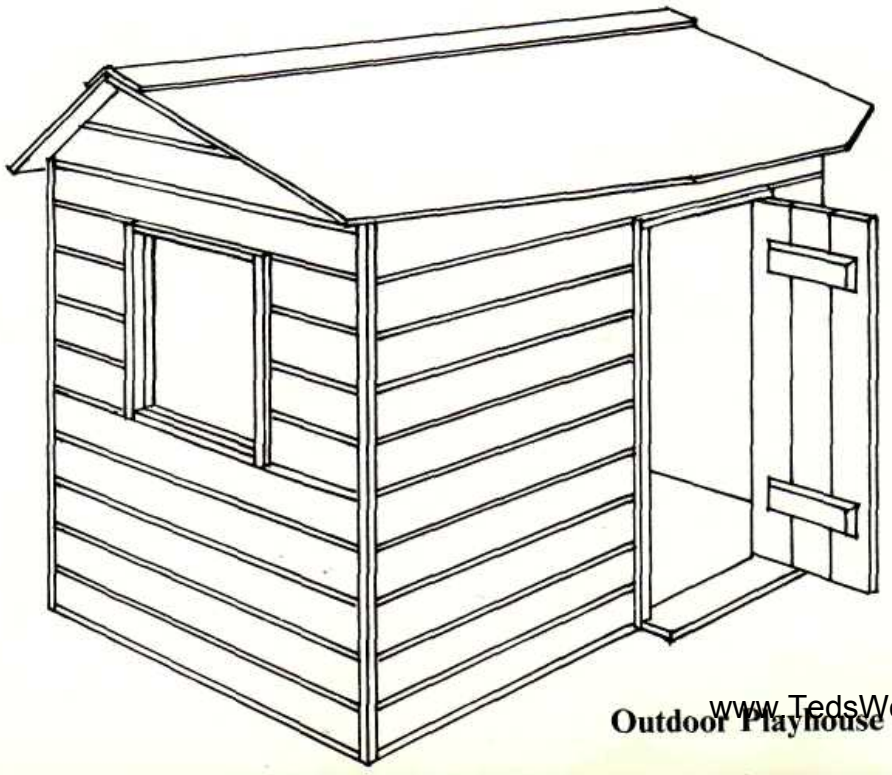
7.1 OUTDOOR PLAYHOUSE and storage shed

As the above title indicates, this unit serves two distinct purposes—one at a time, of course. At first it is the exclusive property of the children—its use limited only by the imagination of the young people themselves. And when the summer days of childhood give way to the homework-ridden nights of the teen-ager, it can have a second life as a workshop, storage shed for bikes and lawn mower, croquet equipment, ice skates, and the like.

List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness	×	width	×	length
A	4	planks	1		11⅝		76½
B	3	rails	2		2		46½
C	7	supports	1½		1½		62
D	2	supports	1½		1½		71
E	1	support	1½		1½		66
F	2	rails	1		2½		54
G	1	rail	1		2½		26
H	1	step	1		2½		26
J	2	rails	1		2½		23¼
K	2	rails	1		2½		24
L	4	cleats	¾		¾		62
M	3	boards	¾		8		54
O	2	rails	¾		3		23
P	1	Masonite panel	¼		45		84
Q	1	Masonite panel	¼		21		84
R	22	boards	¾		6¼		46½
S	20	boards	¾		6¼		76½



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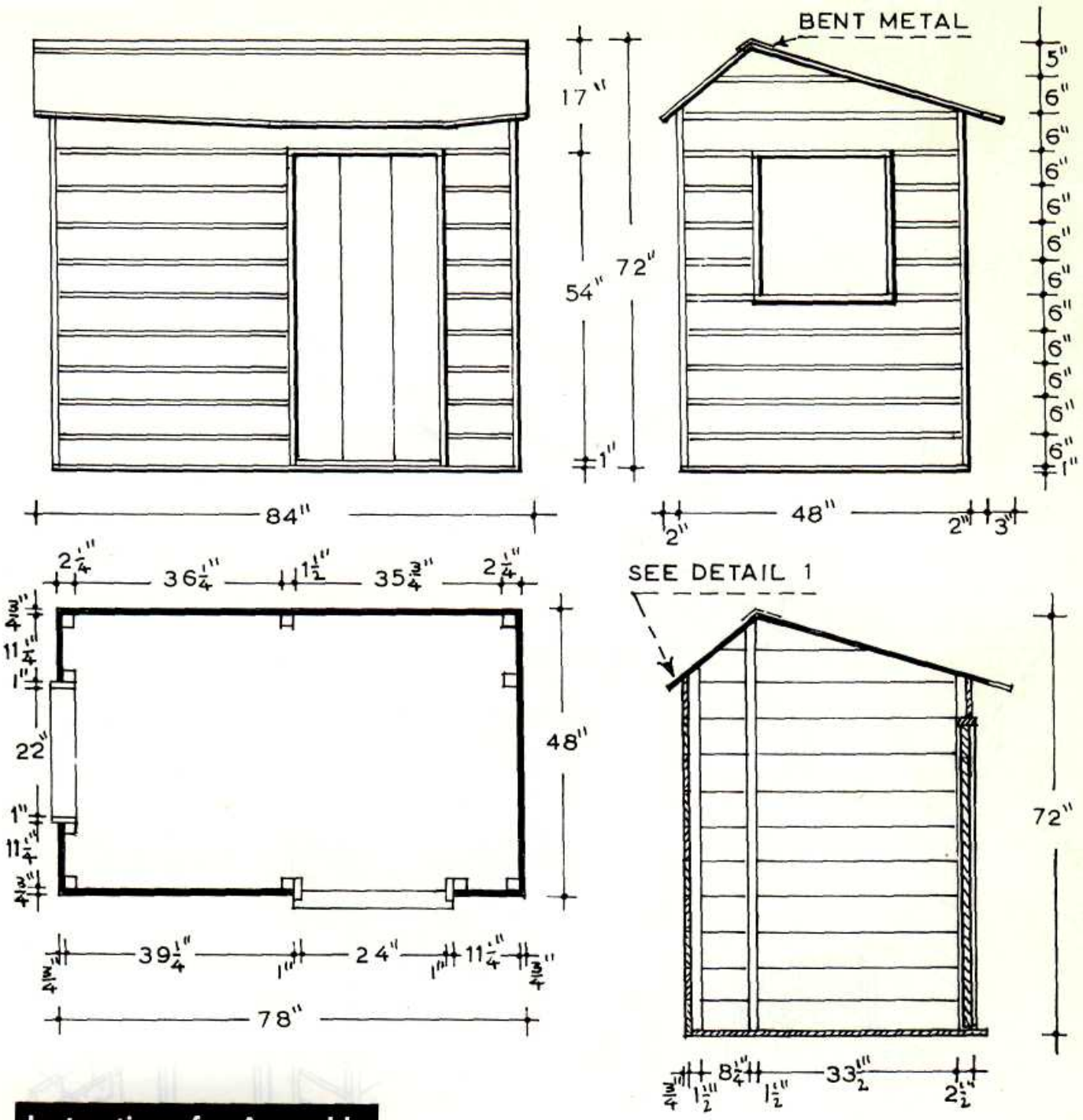

Instructions for Assembly

1. Connect floor (A) with rails (B).
2. Erect walls, joining boards (S) with supports (E) and fasten to floor.
3. Attach boards (R) to supports (C, D, E) and floor; cut space for window and door.
4. Install roof (P, Q) and fasten metal to it for water protection.
5. Attach rails (F) and (G) and bottom (H); assemble door and join rails (O) with boards (M) and rails (F).
6. Attach rails (J) and (K) to window, using clear polyethylene plastic film in place of glass.
7. Apply finish.

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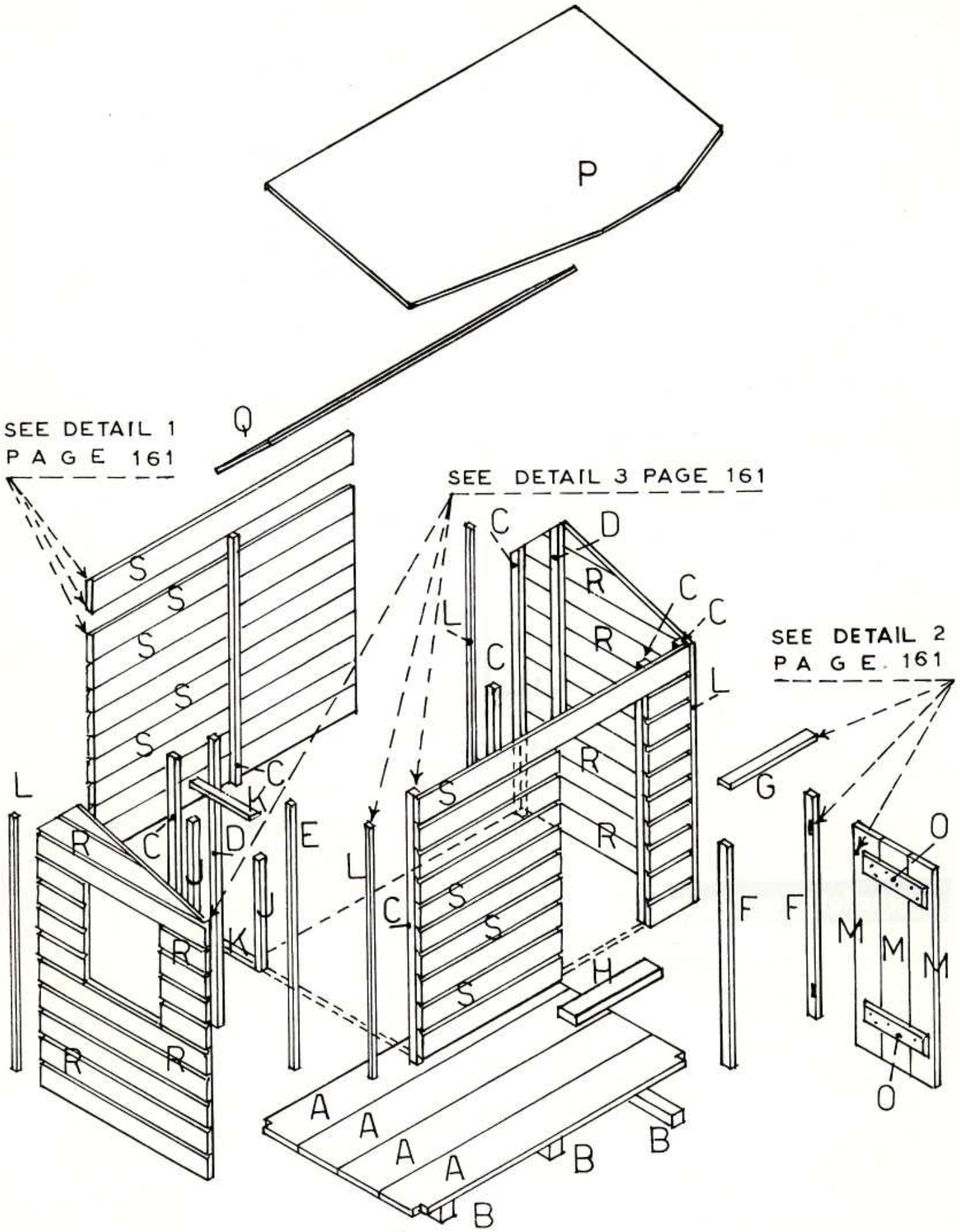

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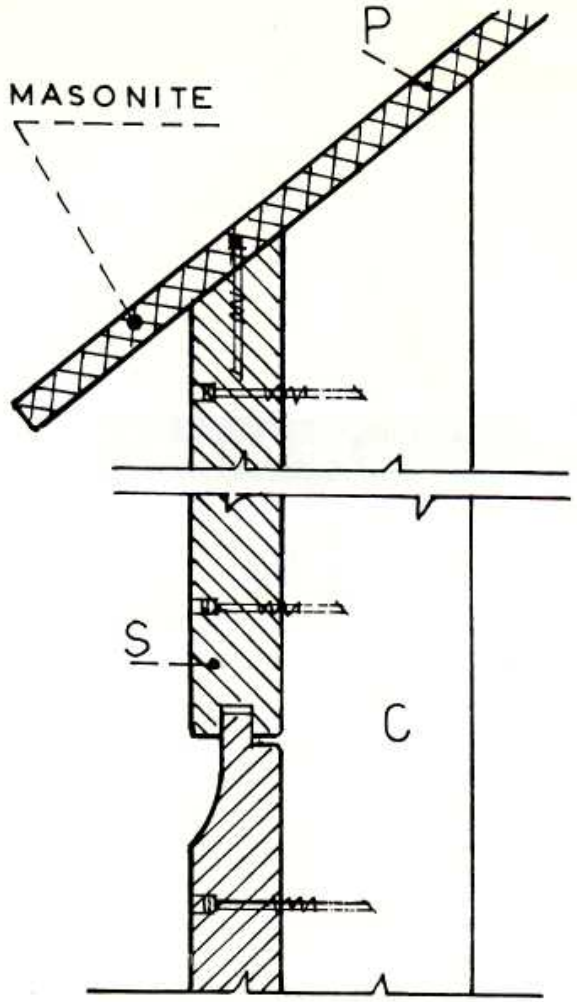
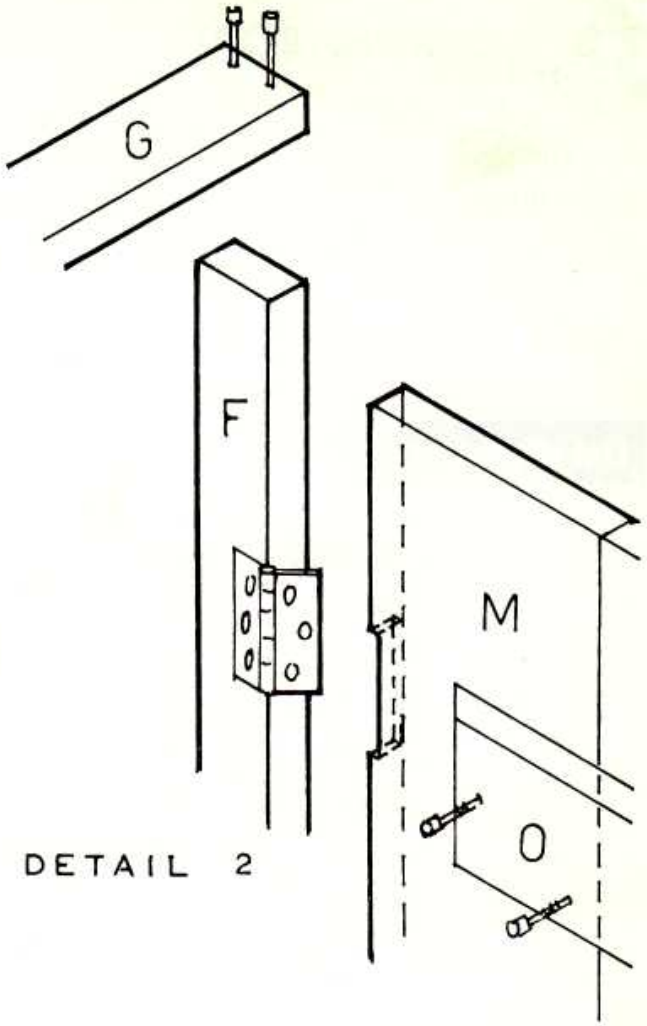


DETAIL 1



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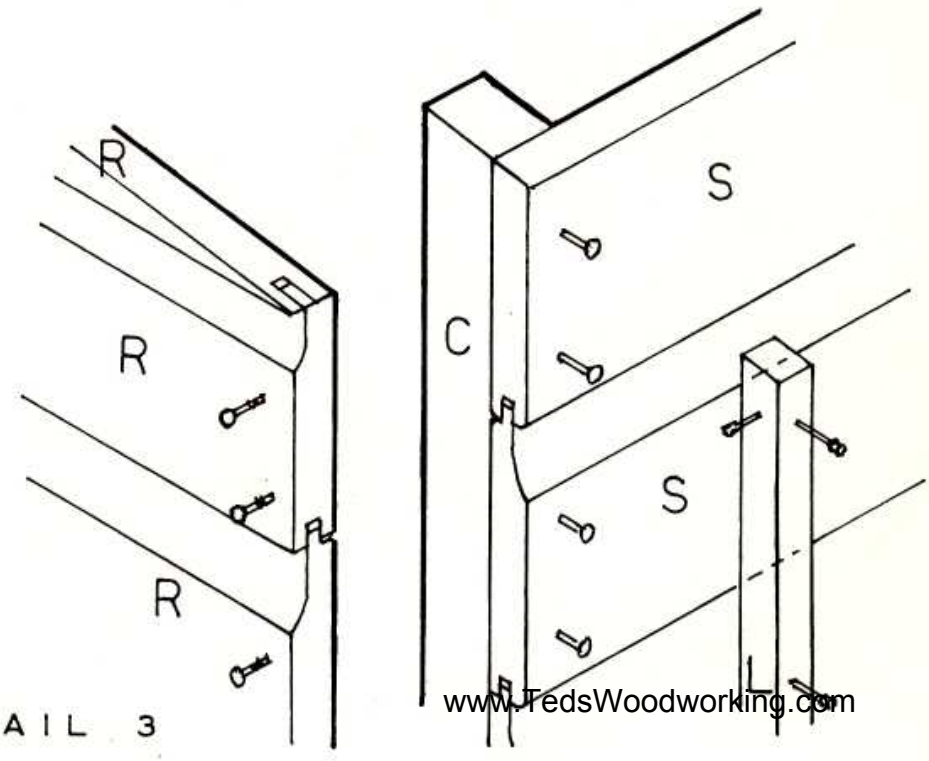

DETAIL 3

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7.2 ROCKING BOAT

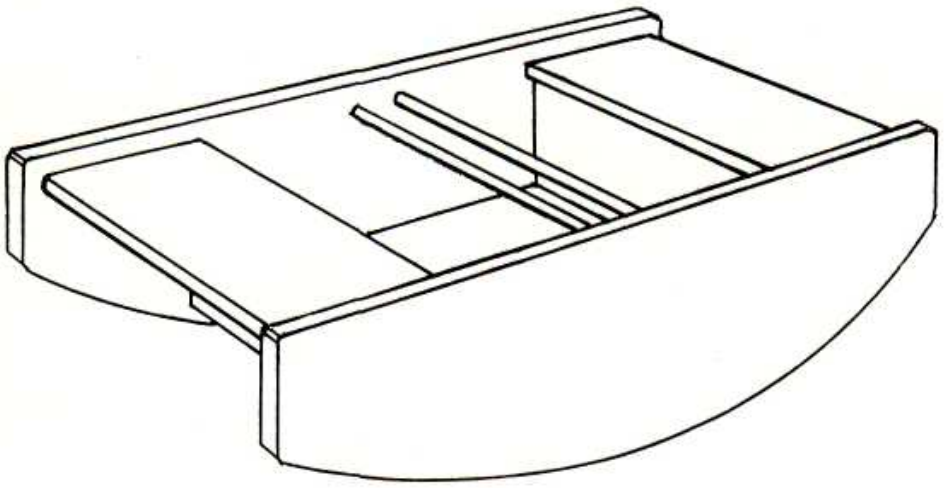
For dry-land sailors, junior grade, as well as owls and pussycats—as seaworthy as the *Enterprise* if the billows remain imaginary. The fearful trip done, our captain and crew become mountain climbers by the simple expedient of turning the craft over. Easy to make and easier to store.

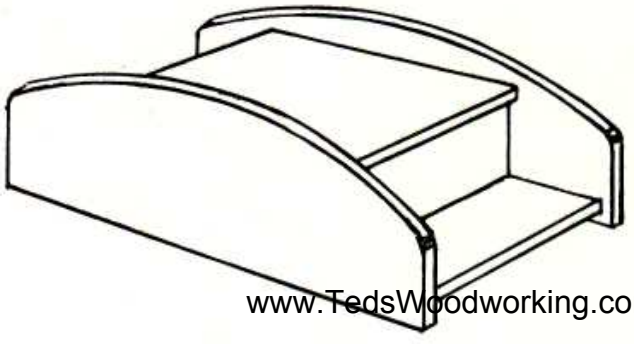
List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length		
A	2	sides	¾	12	36
B	2	seats	¾	9	16½
C	2	partitions	¾	6	16½
D	1	bottom	¾	22	16½
E	2	dowels	1 diam.		18

Instructions for Assembly

1. Join seats (B) with bottom (D) and partitions (C).
2. Fasten sides (A) to seats (B), partitions (C), bottom (D) and dowels (E).
3. Apply finish.





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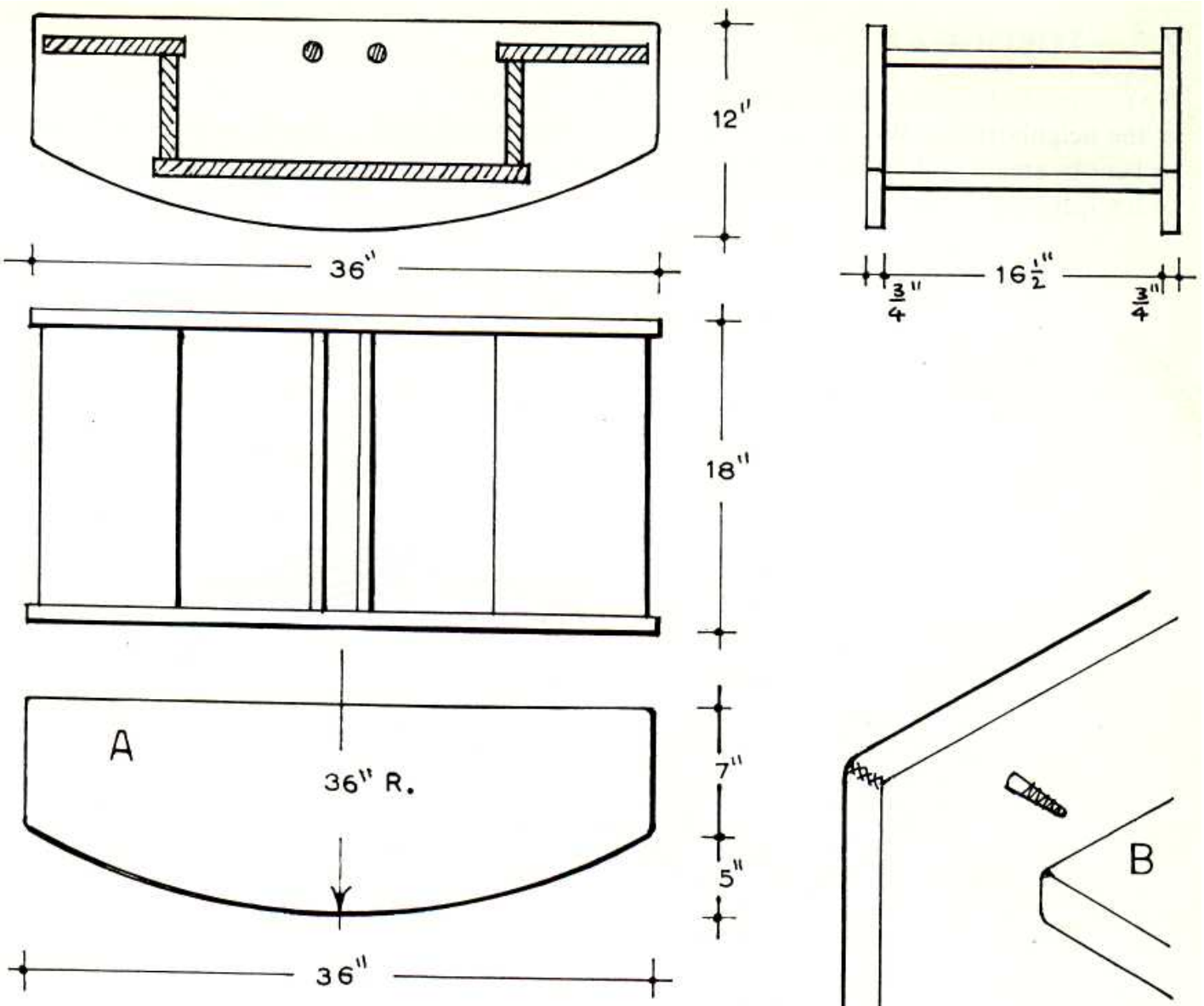
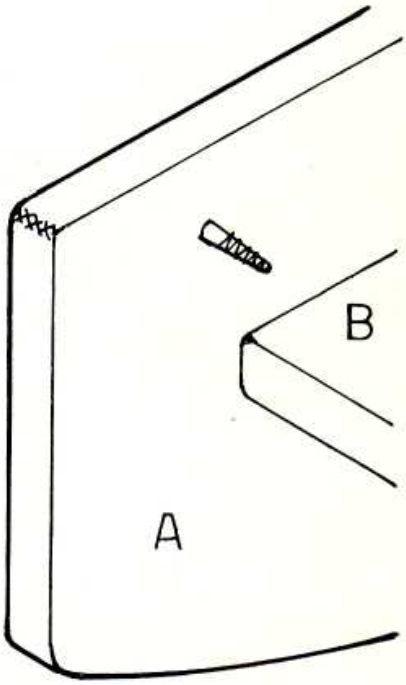
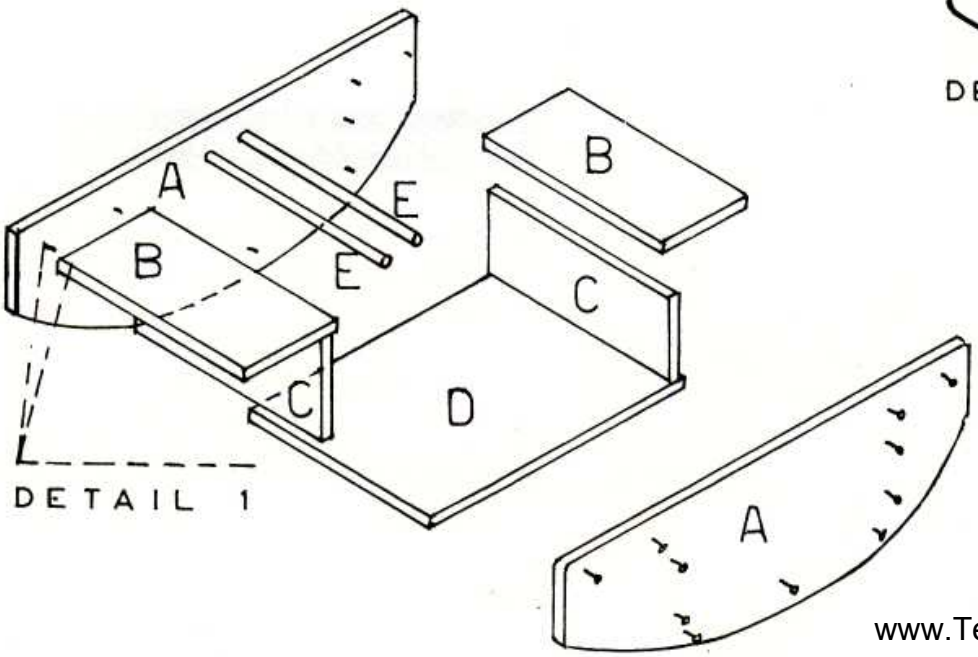




DETAIL 1



DETAIL 1

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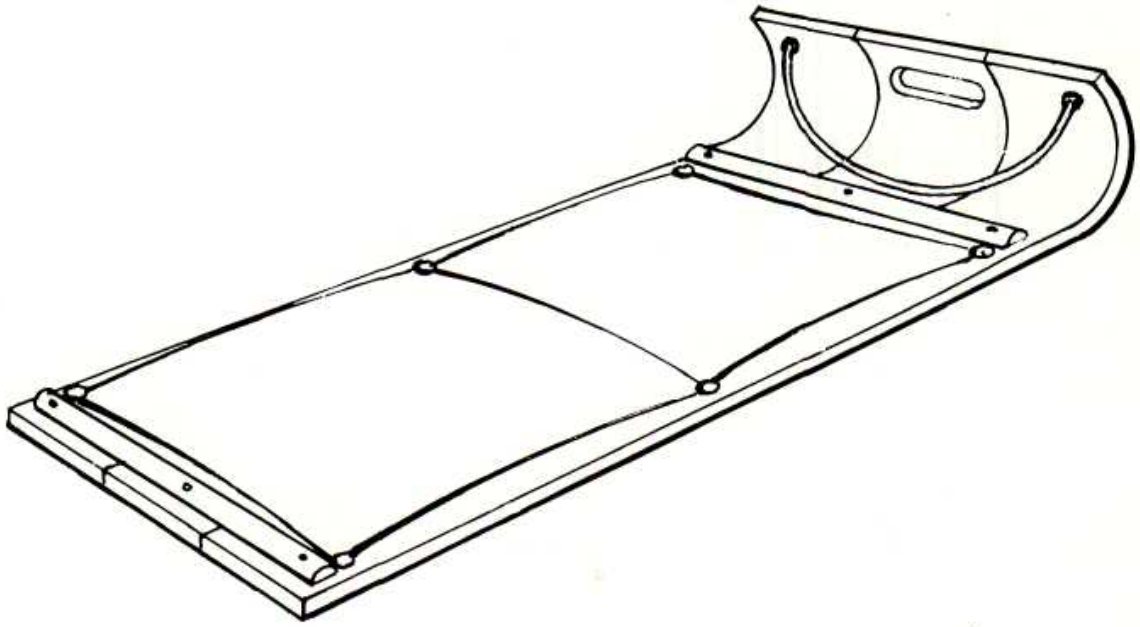
7.3 TOBOGGAN

No toy this, but a full-scale, six-foot inflexible flyer for teen-agers hopeful of finishing second in the neighborhood Winter Olympics. Built of hardwood, such as beech or elm, that can be bent by steam and pressure to form the curved prow as indicated. You can make it seven or ten feet long if you wish!



List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length
A	3	boards	¾ × 5½ × 66 (or more)
B	2	half dowels	1½ diam. × 15½
C	1	cushion	2 × 14 × 45 (or more)

Instructions for Assembly

1. Bend the three boards (A) using steam and pressure to indicated radius.
2. Join the three boards (A) together and attach dowels (B).
3. Apply finish.
4. Fasten cushion (C) to base with metal clips.

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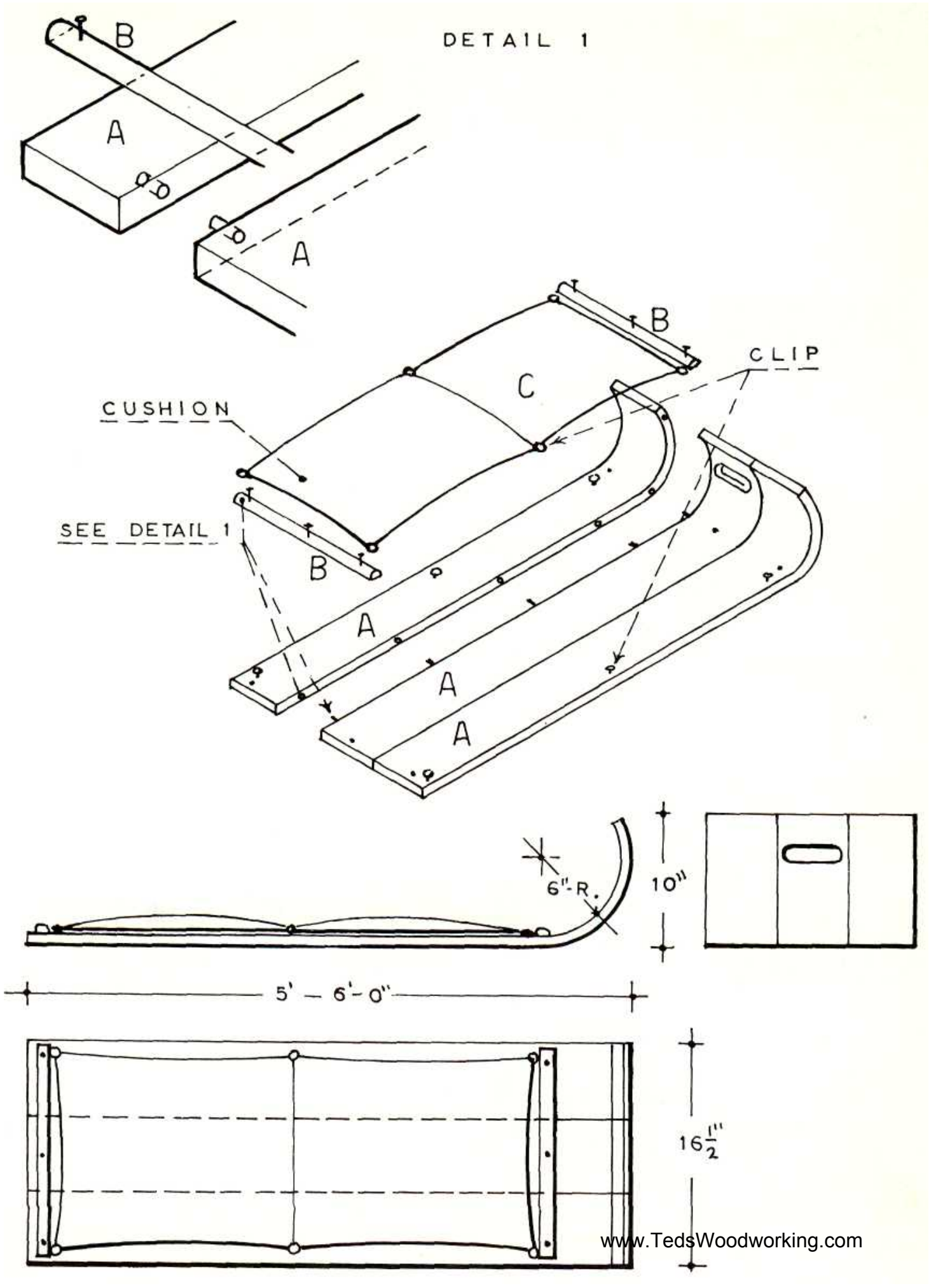
DETAIL 1
B
A
A
B
C
CLIP
CUSHION
SEE DETAIL 1
B
A
A
A
6"-R.
10"
5' – 6'-0"
16 1/2"
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7.4 PARALLEL BARS

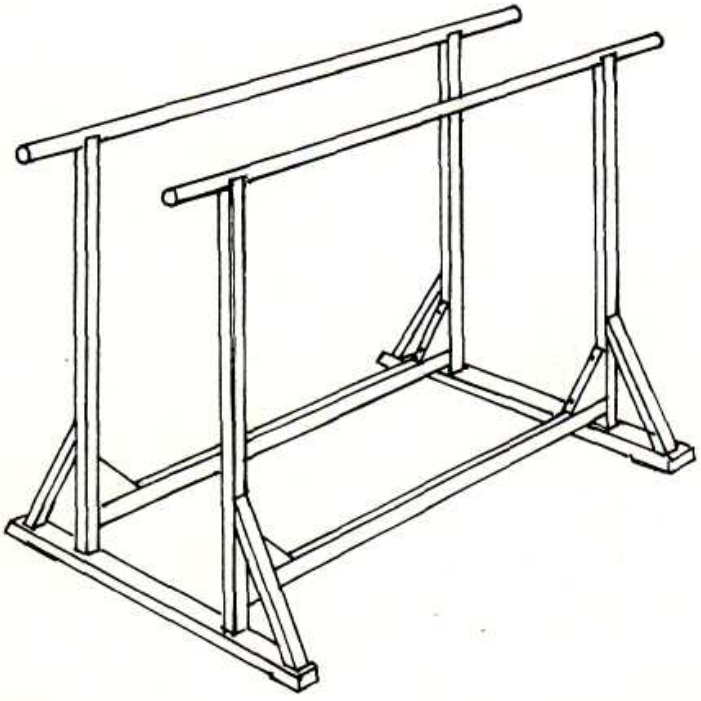
An inexpensive but serviceable version of the professional models found in high-school gyms, this exerciser will see a lot of muscle-building action before it is dismantled. Built in hardwood with tenon-and-mortise joints to withstand the vertical pressures.

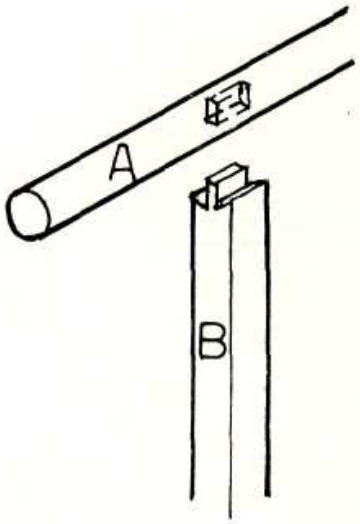
List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length		
A	2	bars	2 diam.		78
B	4	supports	1½	2½	53
C	2	cross rails	1½	4	42
D	2	rails	1½	2½	62
E	4	cross rails	1¼	3½	19
F	4	corner blocks (cut diagonally from two blocks)	1¼	7	7

Instructions for Assembly

1. Join supports (B) to rails (C) and (E).
2. Fasten rails (D) and bars (A) to supports (B) and attach corner blocks (F) to (B) and rails (D).
3. Apply finish.





DETAIL 1

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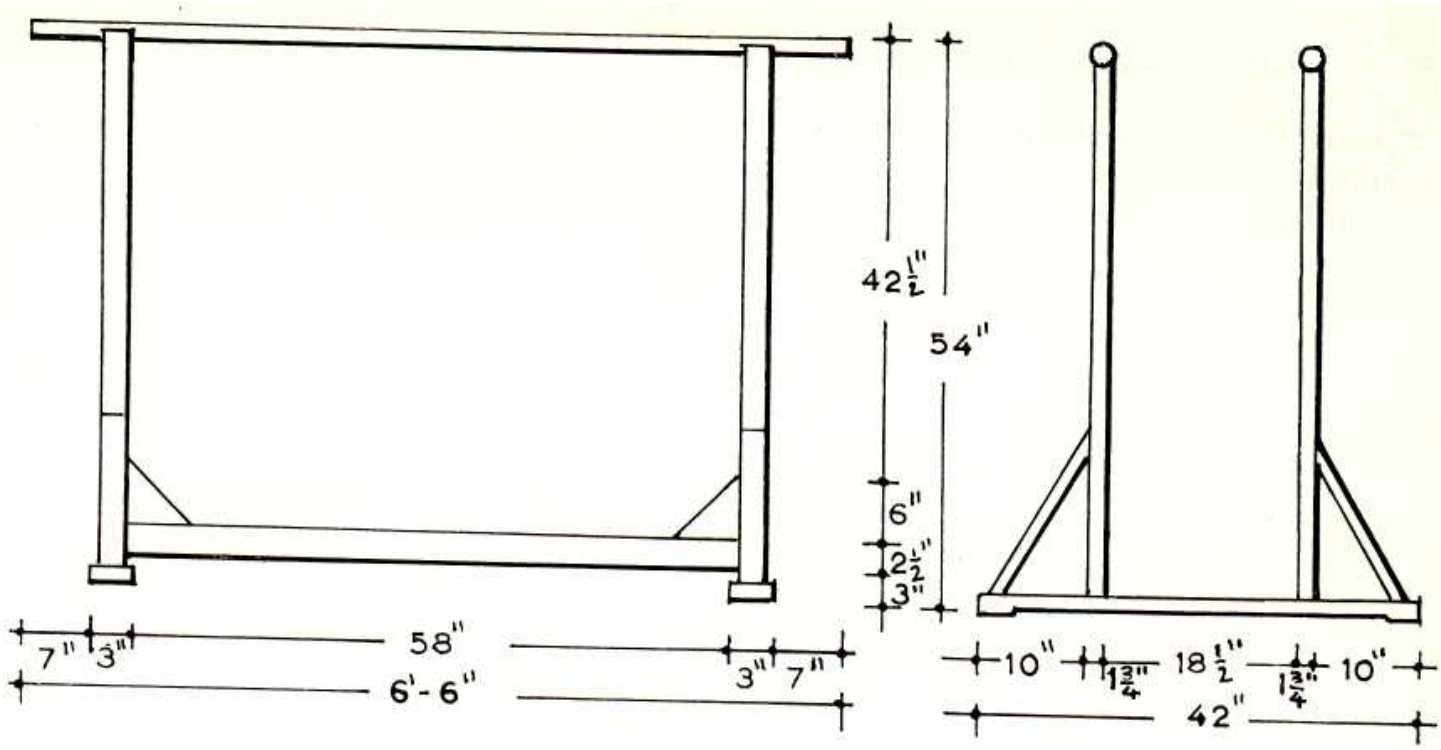

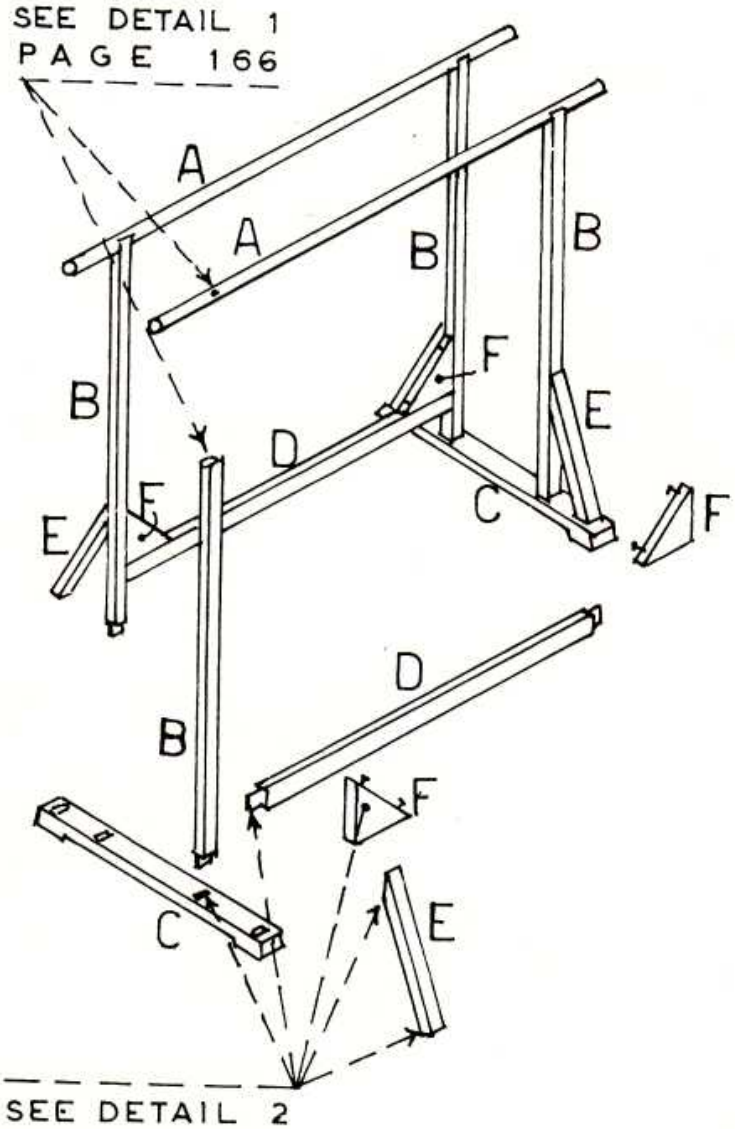

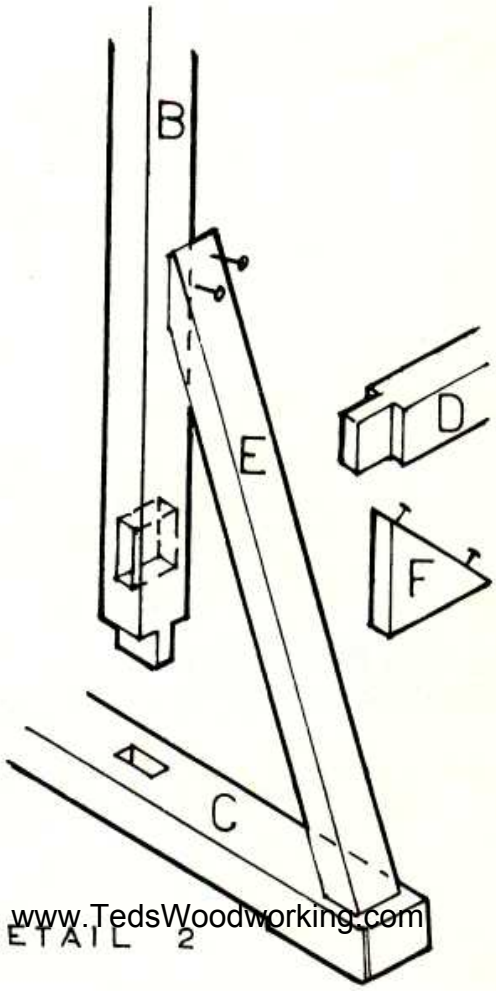

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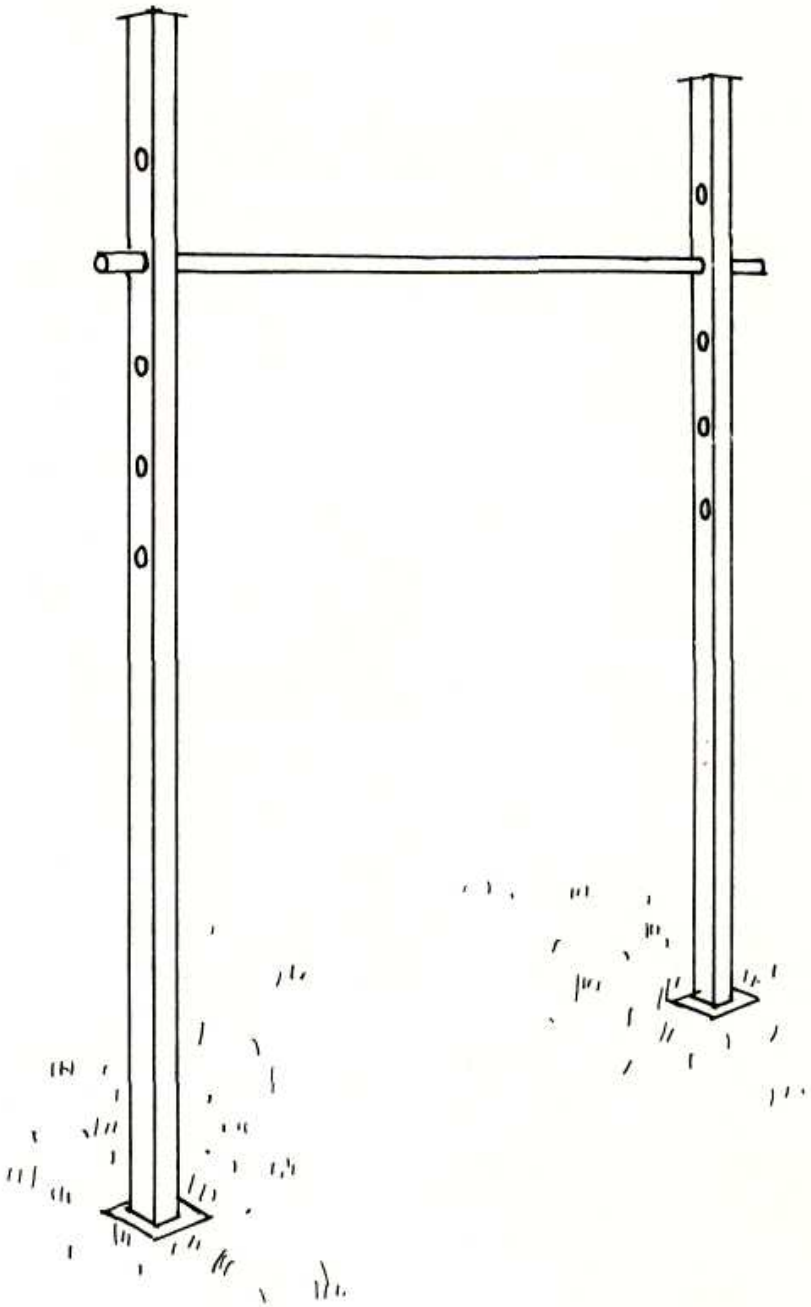
7.5 HIGH BAR (for chinning)

Not intended for high jumps or pole vaults, since the crossbar is fixed in the holes. Its height is adjustable to accommodate a broad range of young athletes. The lumber for the uprights should be treated with creosote before the ends are placed in the ground. For increased safety and sturdiness, concrete footings are indicated.



List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness	×	width	×	length
A	2	supports	4		4		126
B	1	galvanized pipe 1–1¼ outside diameter					80
C	2	metal clips					

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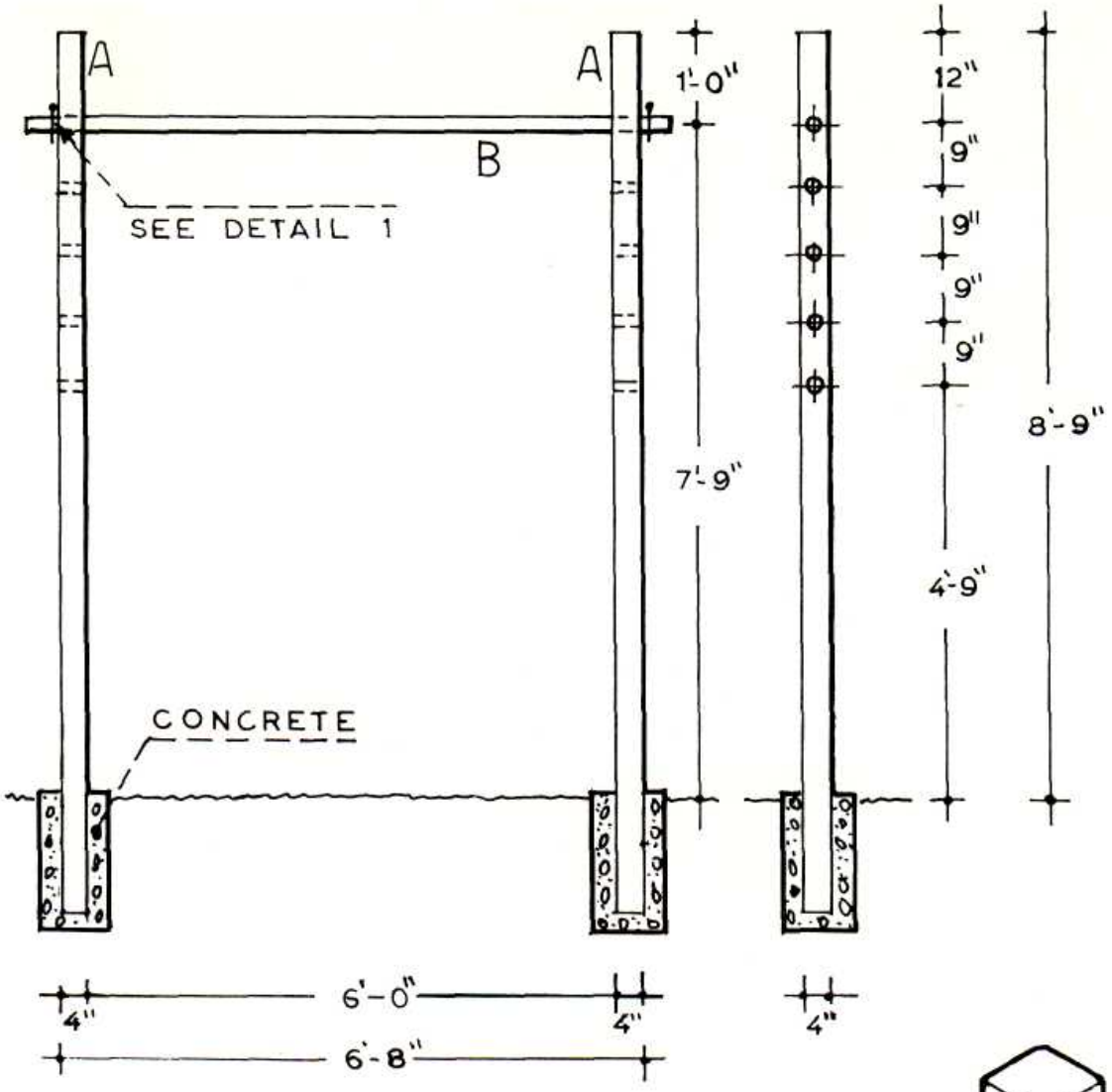
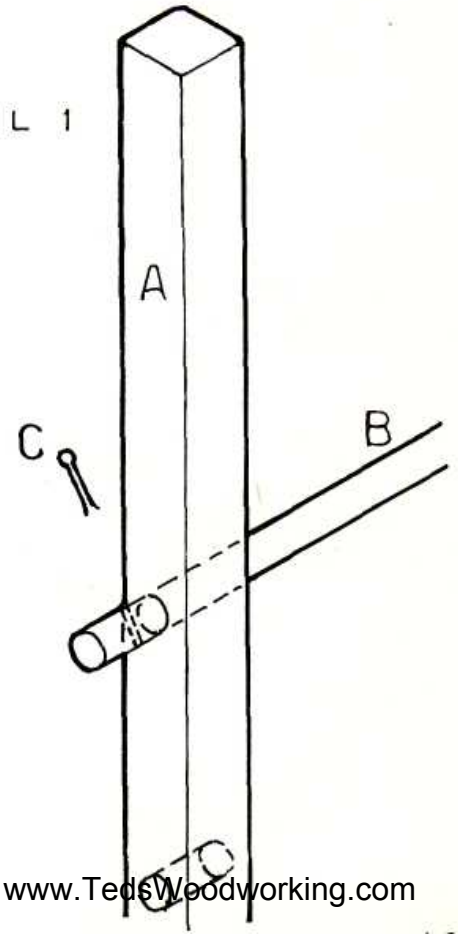


DETAIL 1



Instructions for Assembly

1. Install supports (A) in ground with concrete (min. 10 in. deep).
2. Apply finish.
3. Insert galvanized pipe (B) in desired pair of holes and secure with clips (C).

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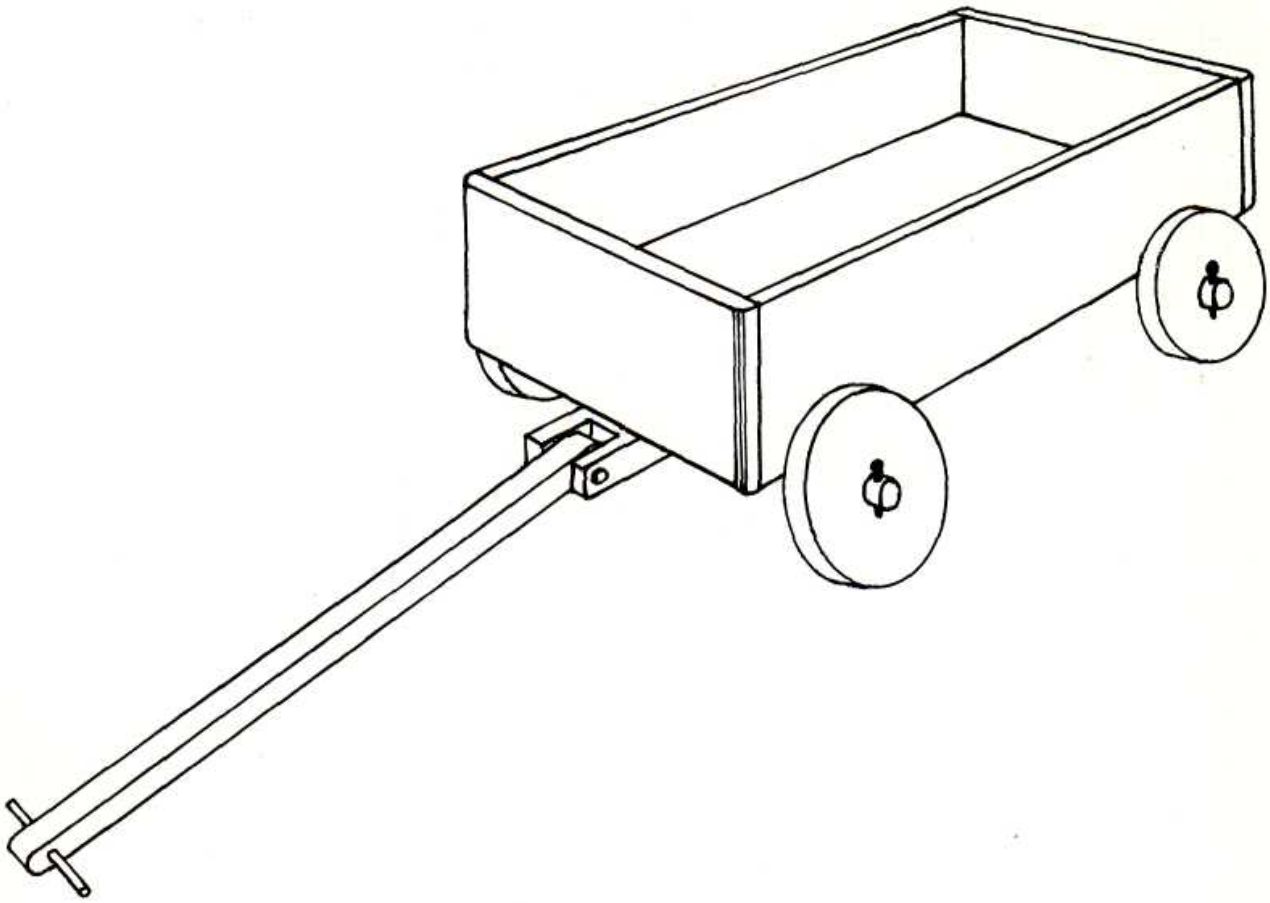
7.6 WAGON

One of the most old fashioned yet perennially popular toys with children everywhere is the wagon, such as the one illustrated here. Made of hardwood and fastened together with screws, this wagon is very solid and easy to make.



List of Materials

A	1	bottom	¾	14½	26½
B	2	front & back	¾	8	16
C	2	sides	¾	8	26½
D	2	cross rail	¾	2½	16
E	2	axles	1	2½	21
F	1	block	1	3	13
G	4	wheels	¾	7 diam.	
H	1	handle	1	1¼	30
J	1	dowel	¾ diam.		6

2 bolts as indicated

Instructions for Assembly

1. Join bottom A with sides C and front and back B.
2. Attach cross rails B and back axle E to bottom A.
3. Attach block F to front axle E, and join together all parts (A, D, F, E) with ⅜–16 bolt.
4. Attach dowel J to handle H, and join handle H to block F with ¼–20 bolt.
5. Insert wheels G to axles F, and apply one or two coats of linseed oil.

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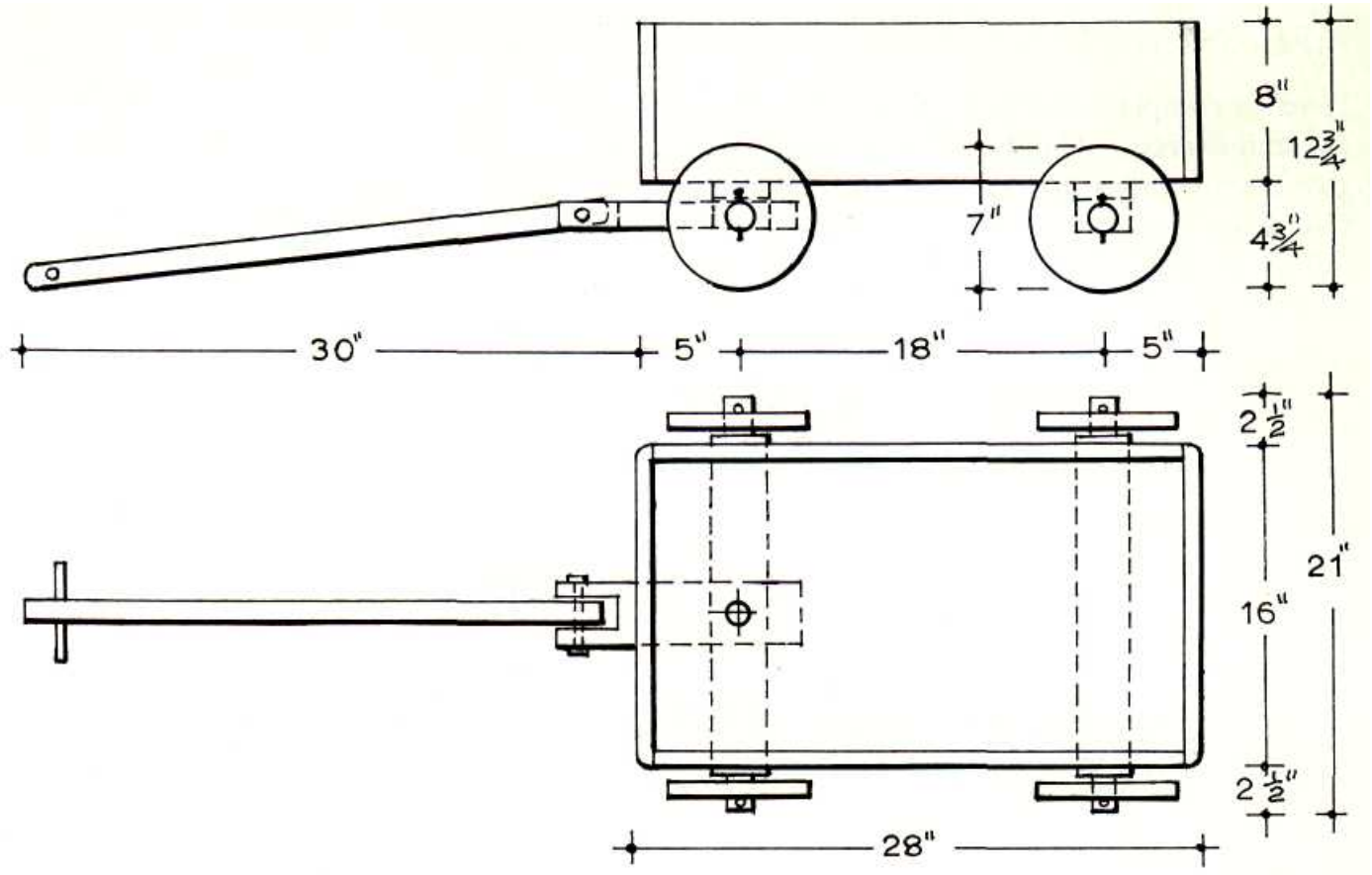

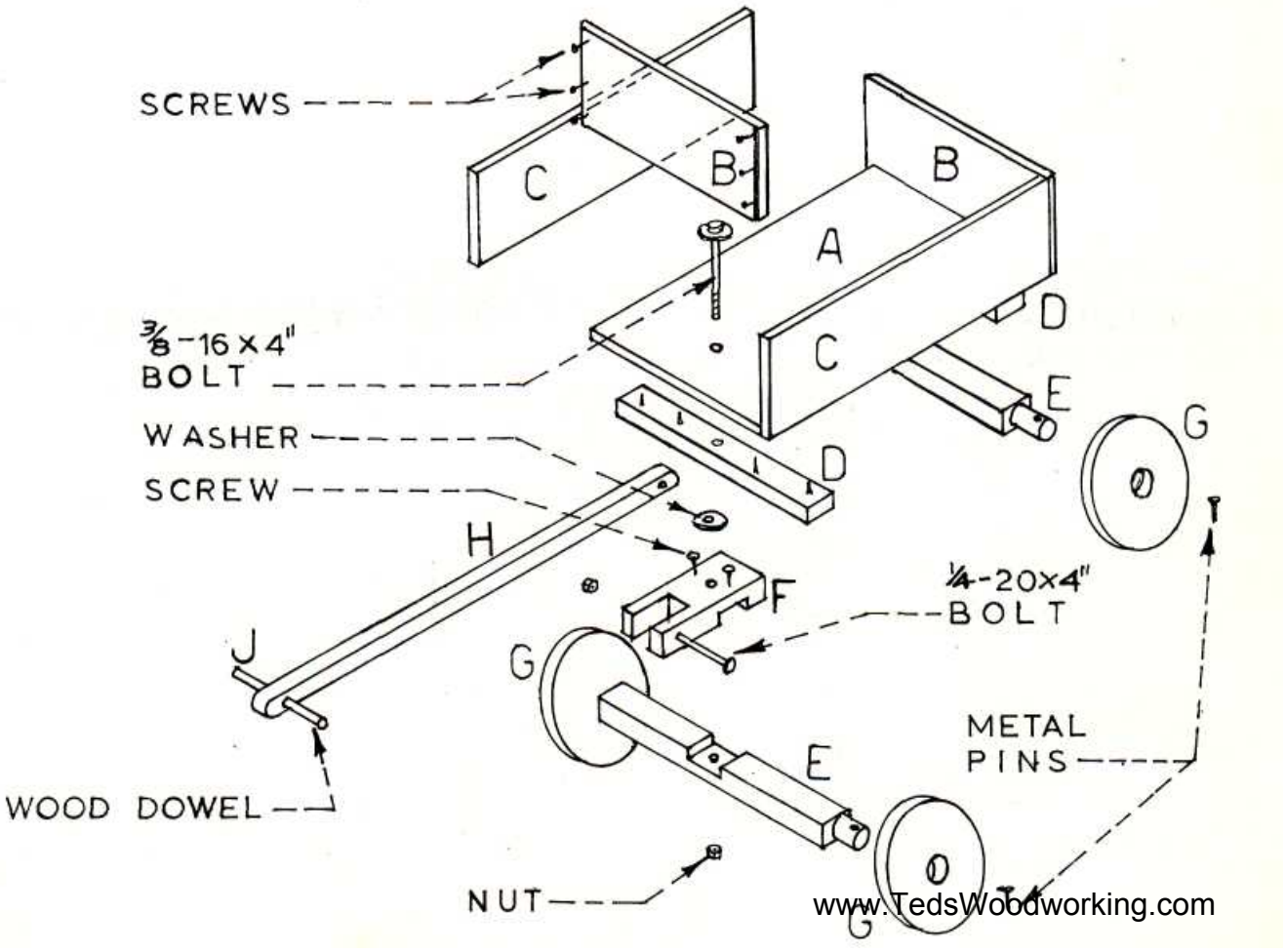

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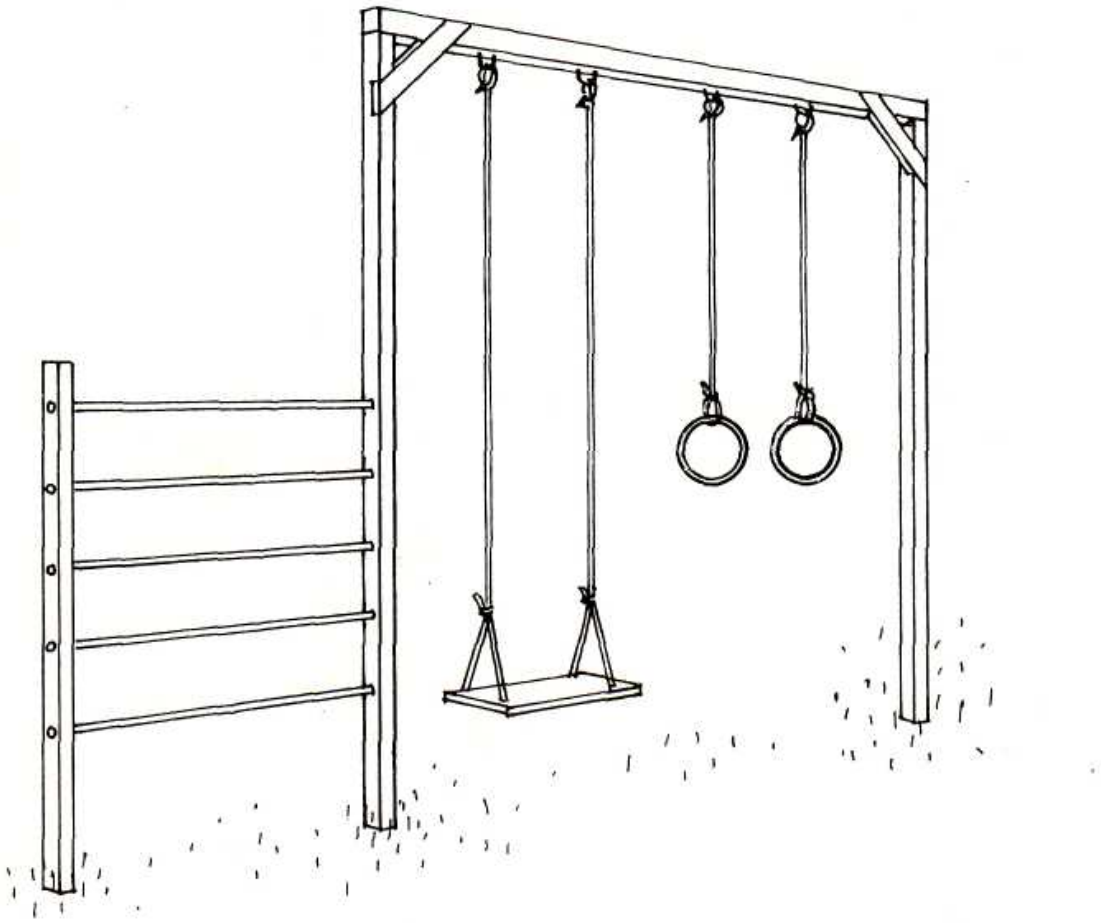
7.7 SWING AND TRAPEZE with climbing bars

Here's a complete outdoor gymnasium for young folks, designed for safety as well as good fun and exercise. The four-by-four uprights will take all the bending stress a swinger can give them without the need for sway-bracing, which makes for a less cluttered appearance. Use nylon rope or approved swing chain rather than trusting to clothesline cord or other dubious substitute. As in other outdoor projects, treat ends of uprights before setting in concrete.



List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length		
A	2	supports	4	4	168
B	1	support	4	4	115
C	1	cross support	4	4	120
D	2	cross rails	1½	3	27
E	4	lengths of nylon rope or chain			
F	1	seat	1	8	22
G	2	metal rings	8 diam.		
H	5	bars	2 diam.		56
J	6	bolts with headrings			

Instructions for Assembly

1. Join supports (A) to crossbar (C) and rails (D).
2. Insert supports (A) and (B) in ground with concrete after treating ends.
3. Fasten crossbars (H).
4. Install bolts (J) and attach seat (F) and rings (G) with nylon rope or chain (E).
5. Apply finish.

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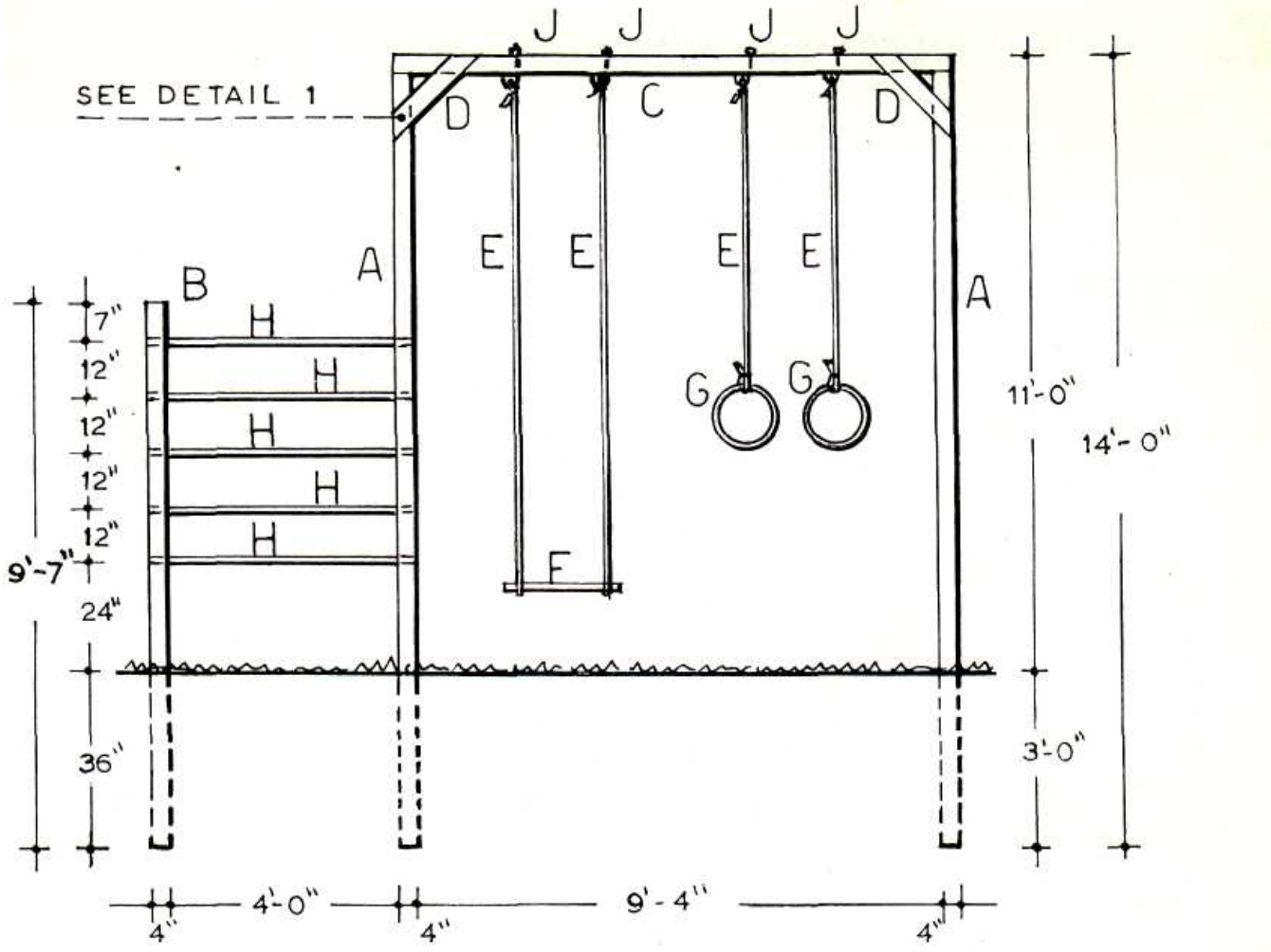

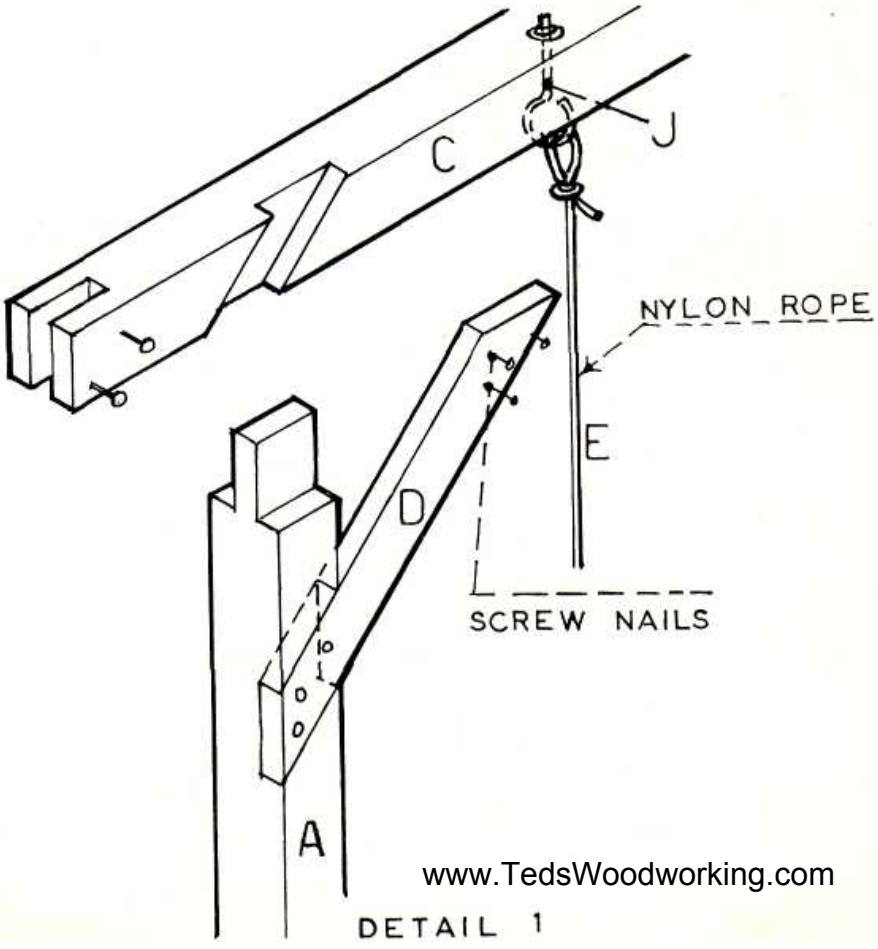

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7.8 SWING, LADDER AND SEESAW

This well-liked preschool and kindergarten combination, useful up to about six or seven years, provides lots of fun and brightens up any backyard. As with all wooden exercise equipment, sandpaper all surfaces to guard against chance splinters and possible injury.

List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length		
A	4	supports	2	4	100
B	1	cross support	2	4	108
C	2	cross rails	1¼	3	48
D	2	blocks	1	8	8
E	2	supports	1¼	3	93
F	5	dowels	1 diam.		18
G	1	plank	1	8	96
H	1	block	1½	8	8
J	1	back	¾	8	14½
K	2	sides	¾	8	13
L	1	bottom	¾	12¼	14½
M	1	length of nylon rope or chain, 12 ft long			
O	4	metal rod	⅜ diam. × 21″ long		

Instructions for Assembly

1. Join supports (A) together and with cross rails (C) and blocks (D).
2. Install dowels (F) in supports (E).
3. Insert supports (A) and (E) in ground (using concrete) and attach cross support (B) blocks (D) and metal rod (O).
4. Join seat or bottom (L) with back and sides (J, K), and attach nylon rope or chain (M) to sides (K) and cross support (B).
5. Install plank (G) and attach block (H).
6. Apply finish.

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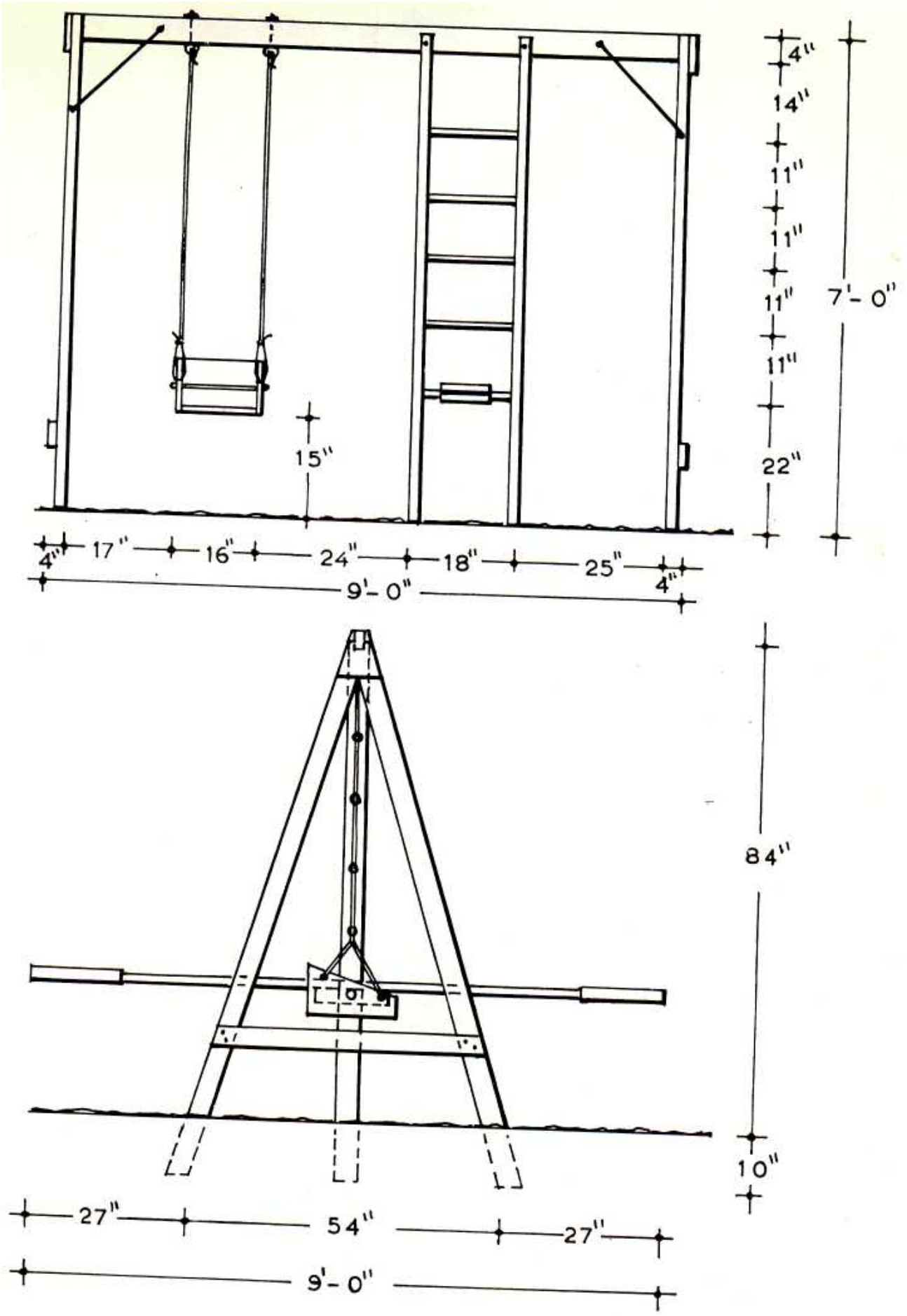

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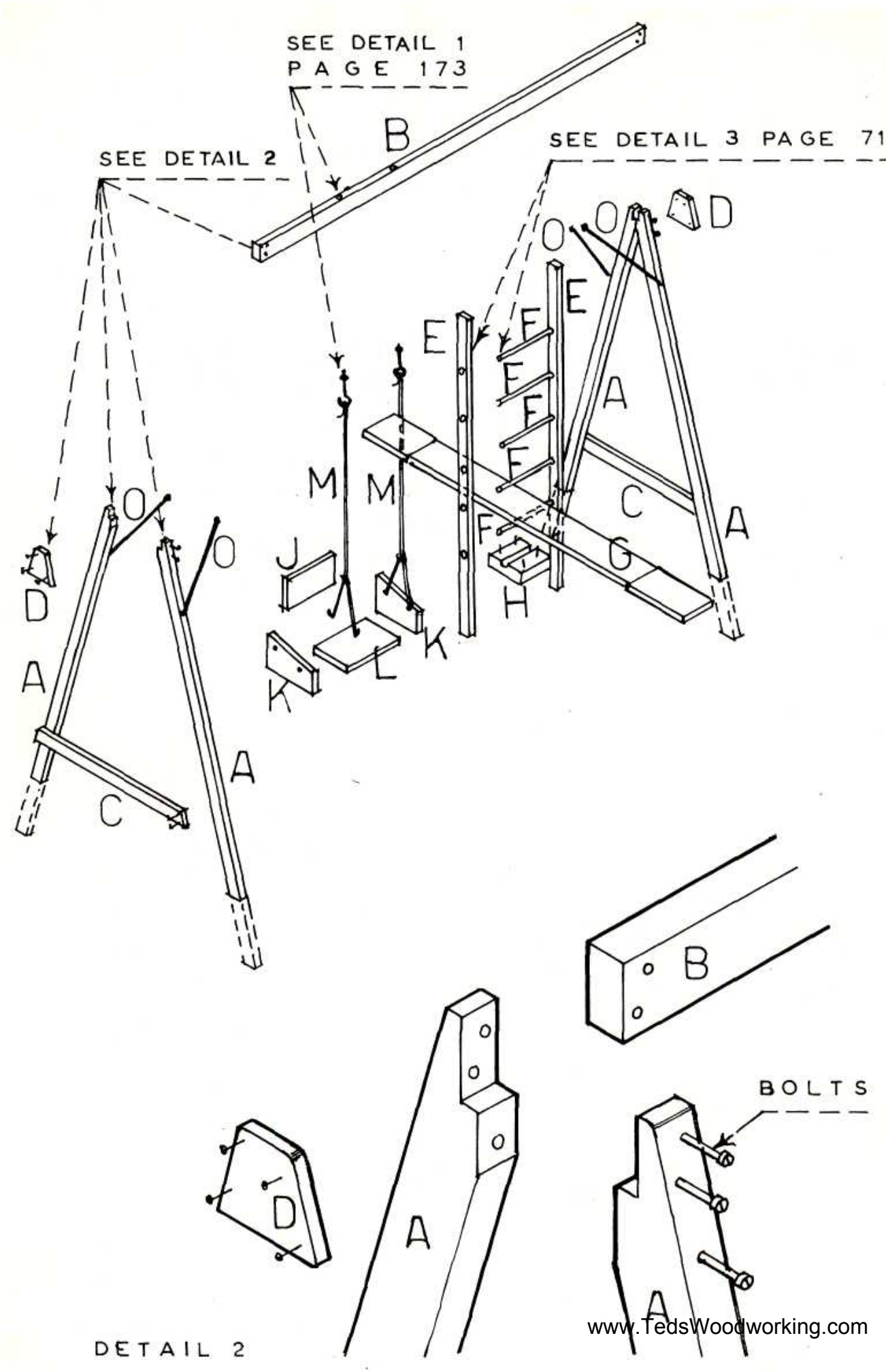

DETAIL 2

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7.9 THREE-WAY LADDER

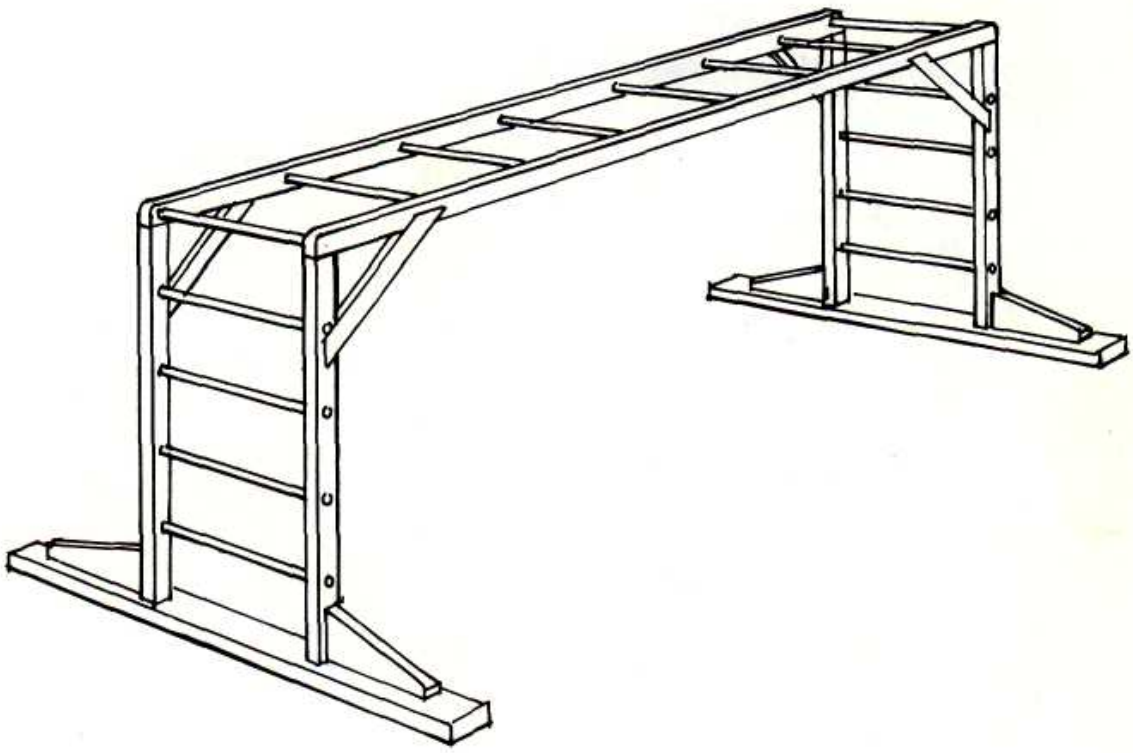
Another version of the "monkey-cage" idea, this securely supported vertical and horizontal ladder is high enough in the horizontal span to allow small children to swing from rung to rung without danger, and to hang upside down with legs through the rungs—thereby building muscles and appetites. Use selected hardwoods for this one.

List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length		
A	2	cross rails	1½	3	96
B	4	rails	1½	3	49
C	2	bottoms	1½	5	48
D	4	corner blocks	1½	5	11
E	4	cross rails	1½	2	24
F	16	dowels	1 diam.		18

Instructions for Assembly

1. Join cross rails (A) with rails (B) and attach rails (E).
2. Install dowels (F) in rails (A) and (B).
3. Fasten rails (B) to bottom (C) and attach corner blocks (D).
4. Apply finish.



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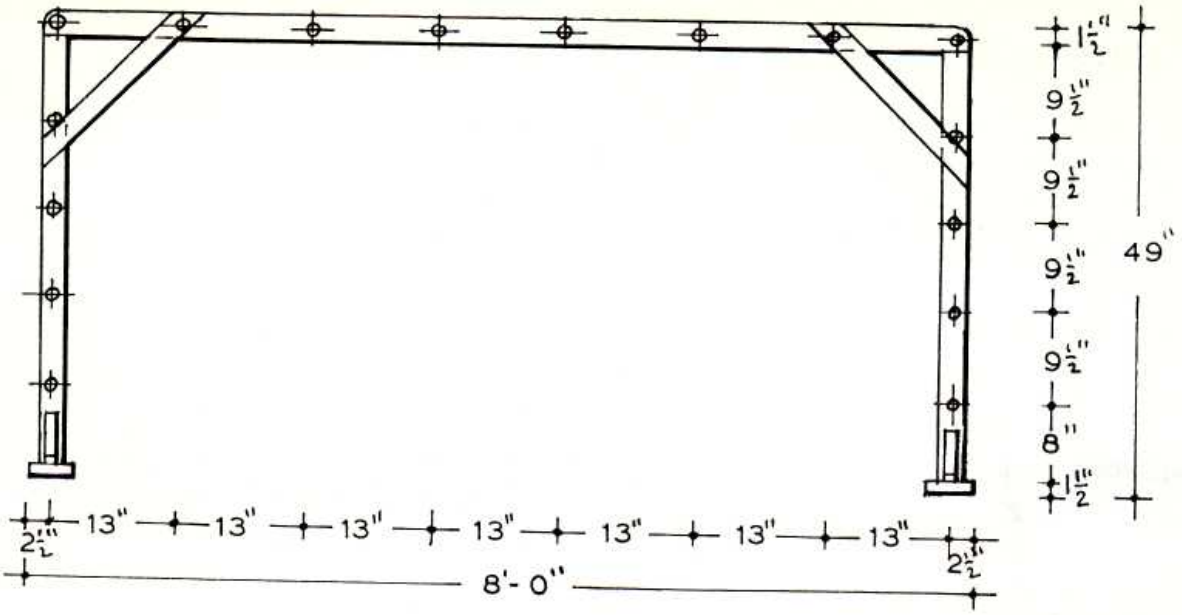

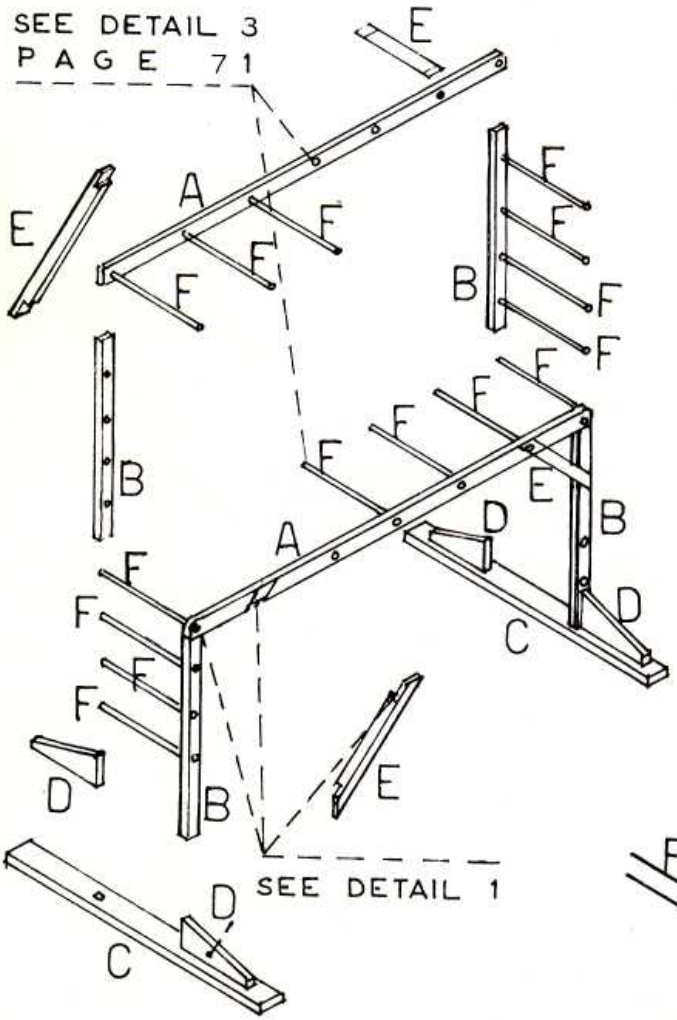

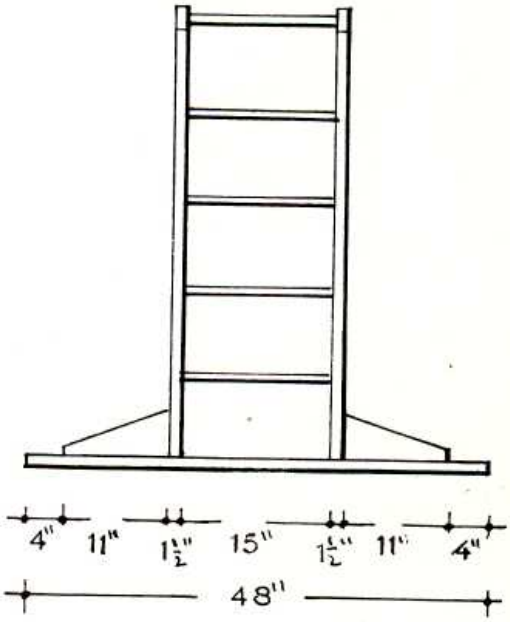

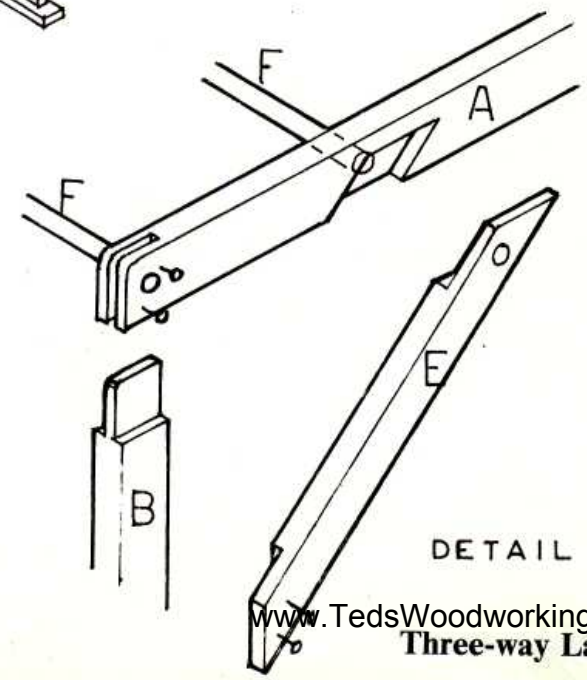

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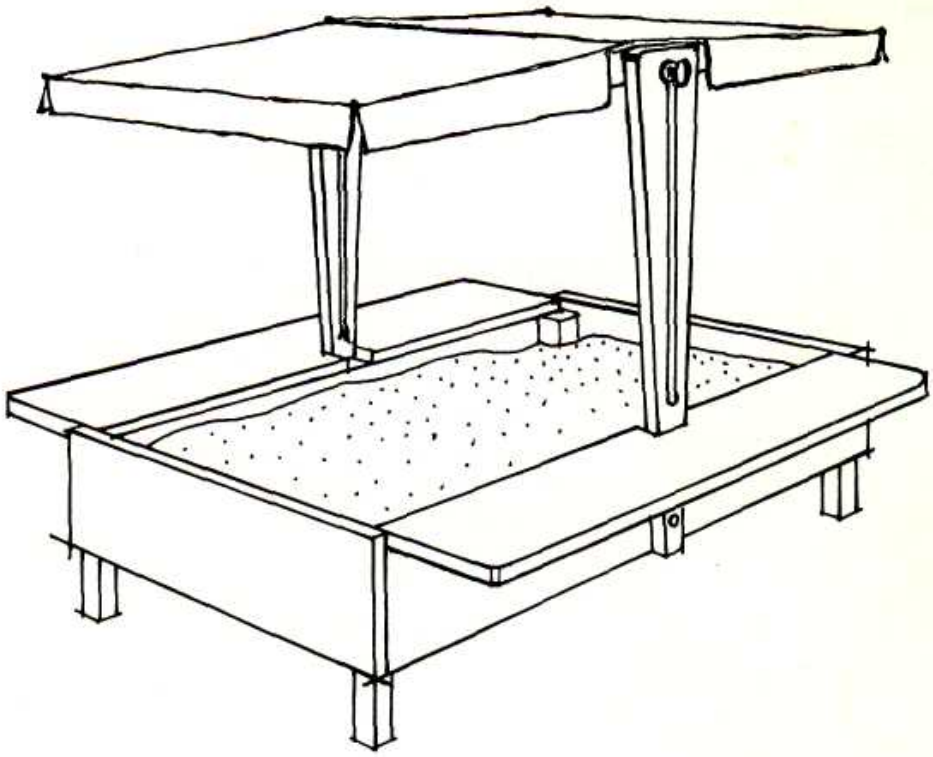
Three-way Ladder

7.10 SAND BOX

The endless fascination of the sand box for preschool children is well known to parents everywhere; no outdoor play area is complete without it. The awning is of plastic material and helps prevent sunburn in prolonged sandpile operations. It keeps the sand from getting wet on rainy days, too.



List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness	× width	× length
A	2	sides	¾	8¼	46½
B	1	front	¾	9	30
C	1	bottom	¾	28½	46½
D	4	legs	1½	1½	14
E	2	seats	¾	6¾	46½
F	2	supports	¾	5	40
G	2	sides	½	2½	48
H	2	rails	¾	2	28½
J	1	plastic sheet		36	72
K	4	corner blocks	1	2½	3½

Instructions for Assembly

1. Join sides (A) with bottom (C) and legs (D).
2. Attach front (B) to sides (A), bottom (C) and legs (D).
3. Fasten corner blocks (K) to seats (E) and sides (A).
4. Join rails (H) with sides (G).
5. Apply finish.
6. Install supports (F) and cover (J).

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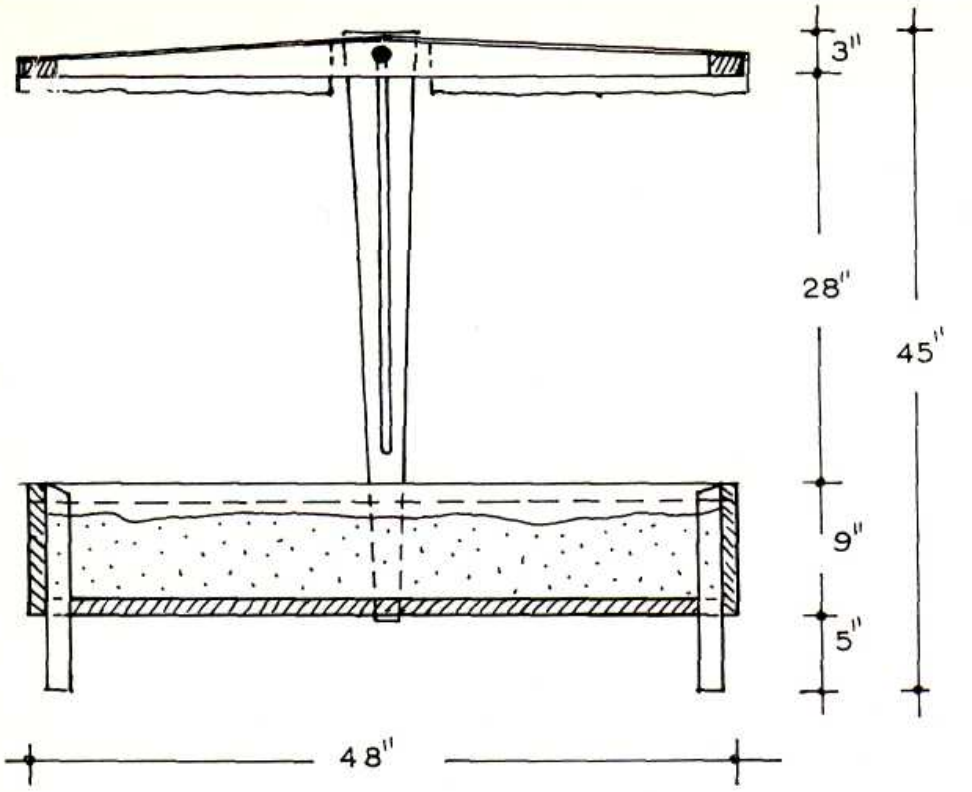
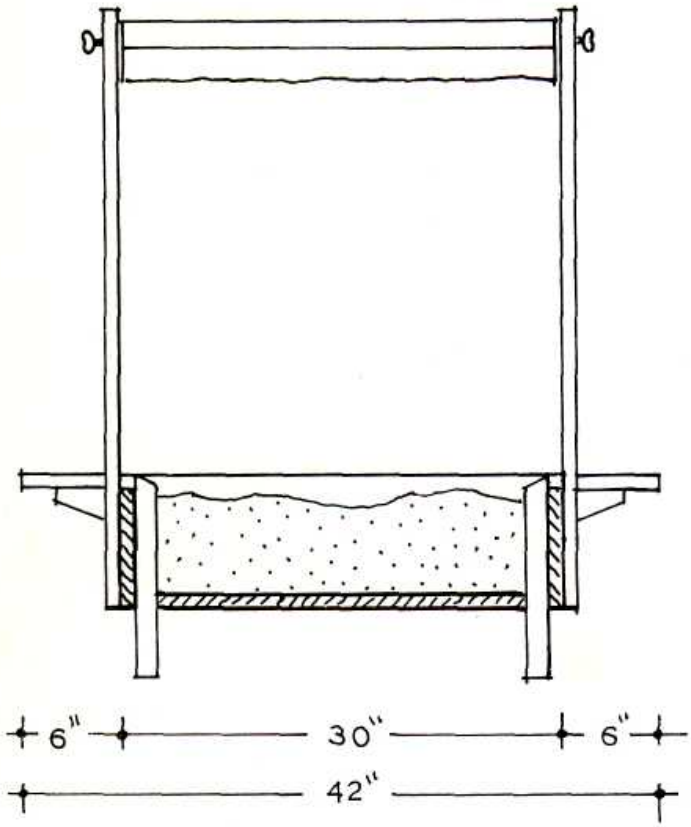
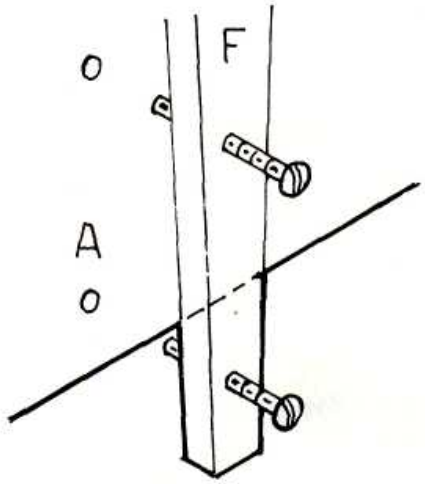
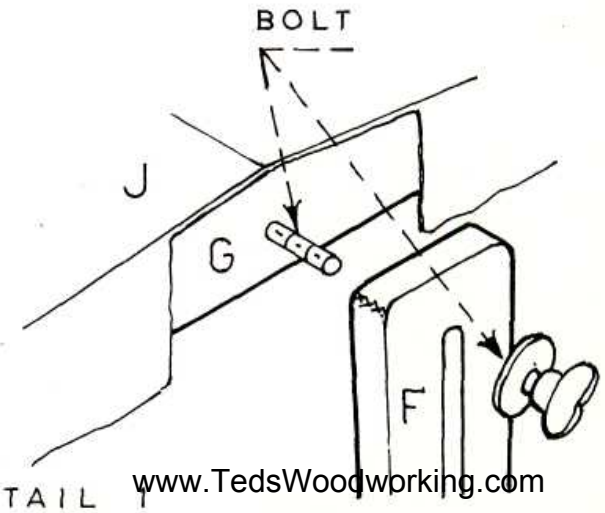






DETAIL 3



DETAIL 1

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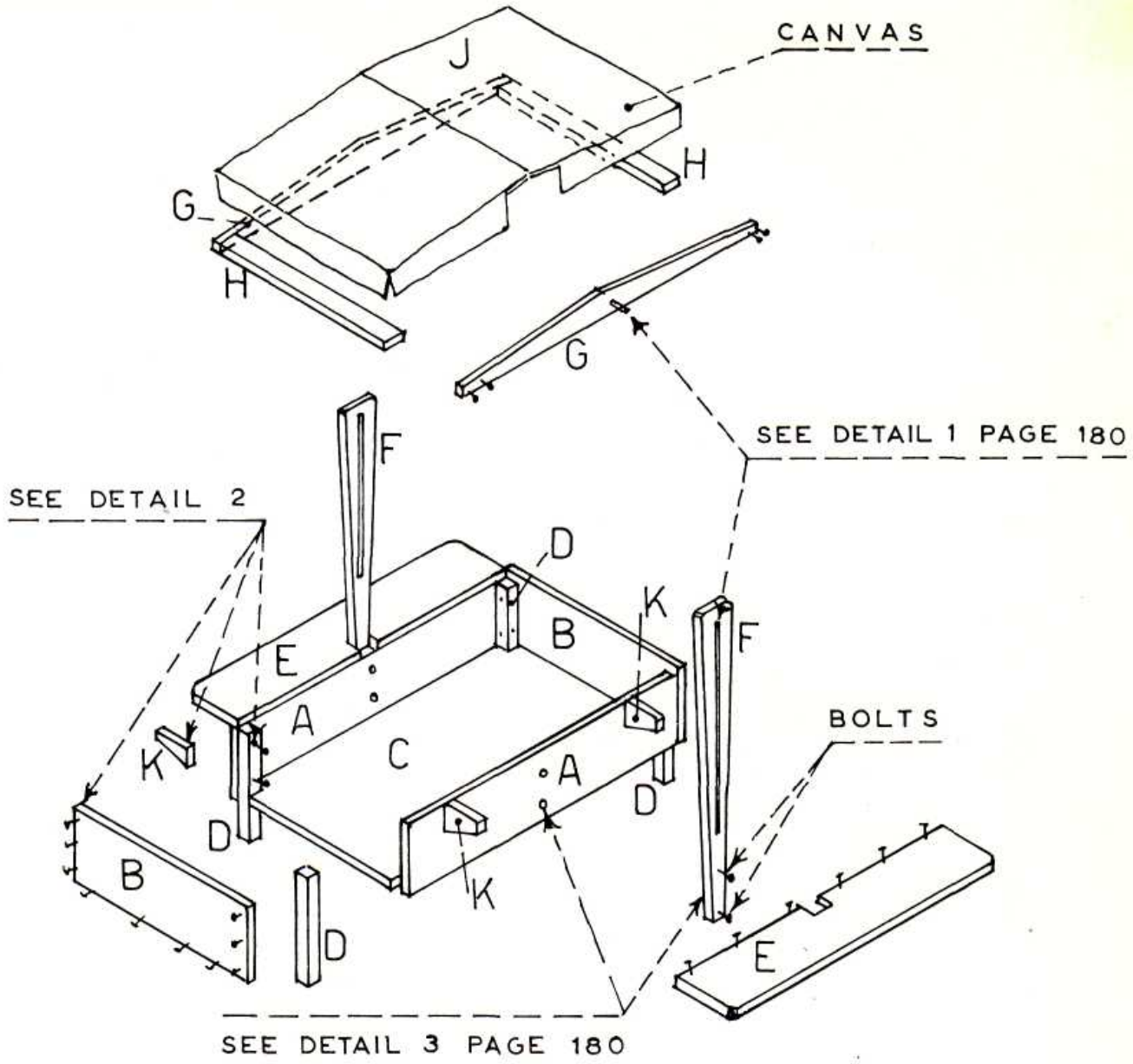

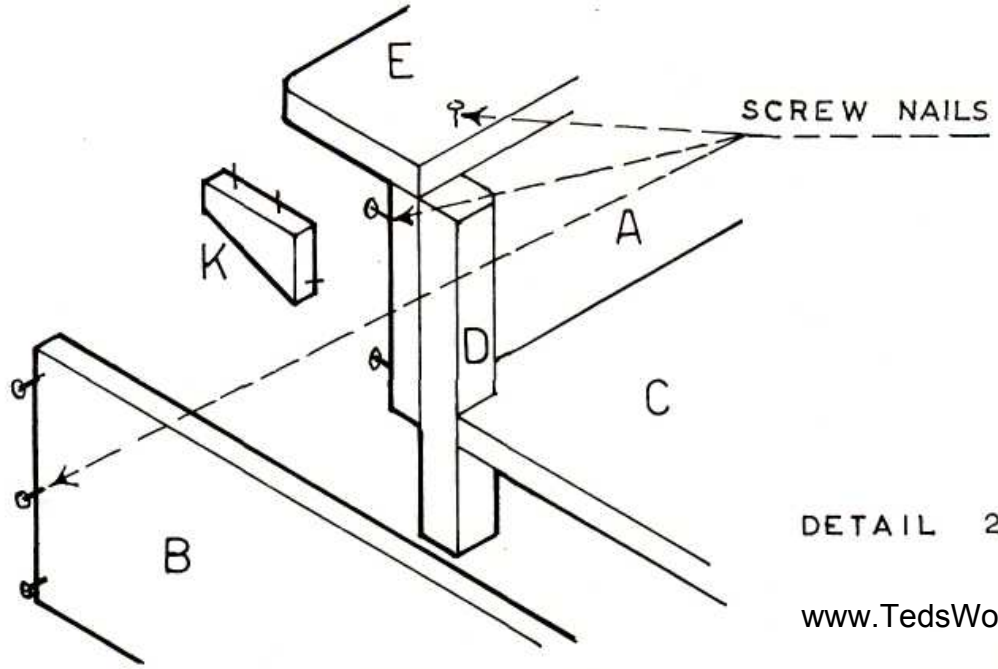

DETAIL 2

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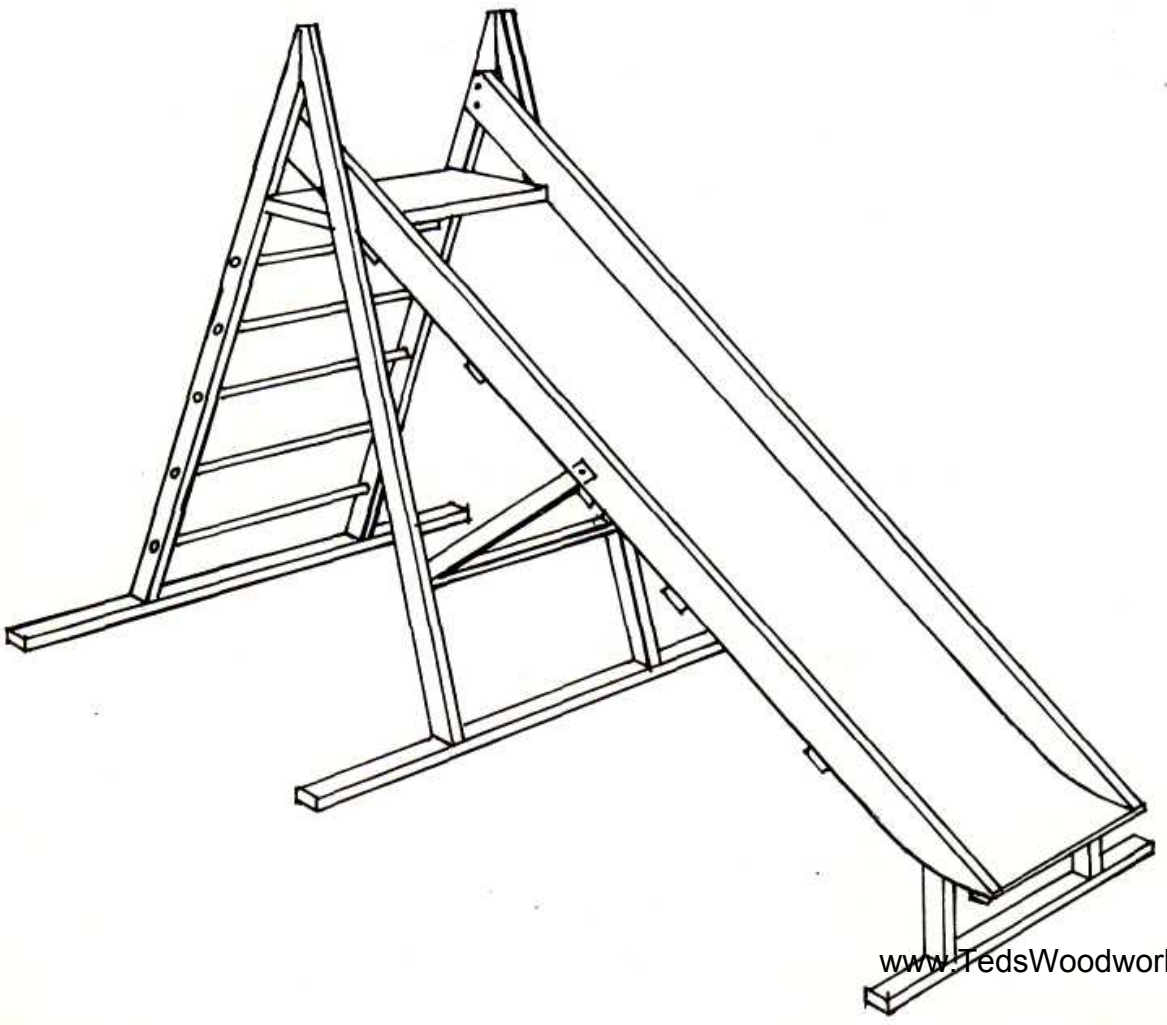
7.11 OUTDOOR SLIDE

This is understandably more exciting than the slide of Project 6.11, having a drop of almost seven feet, which looks scary enough to six-year-olds. Not many slides as sturdy as this one are seen in backyards, and anyone can be justly proud of building it.

List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness	×	width	×	length
A	4	supports	1½		2½		90
B	1	panel	¾		18		21
C	2	bottoms	1¼		4		54
D	2	supports	1		2		33
E	1	rail	1		2		16
F	7	dowels	1 diam.				21
G	1	Masonite panel	¼		18		102
H	2	sides	1		5		120
J	6	cross rails	¾		1½		18
K	1	bottom	1¼		2½		36
L	2	supports	1¼		2½		18



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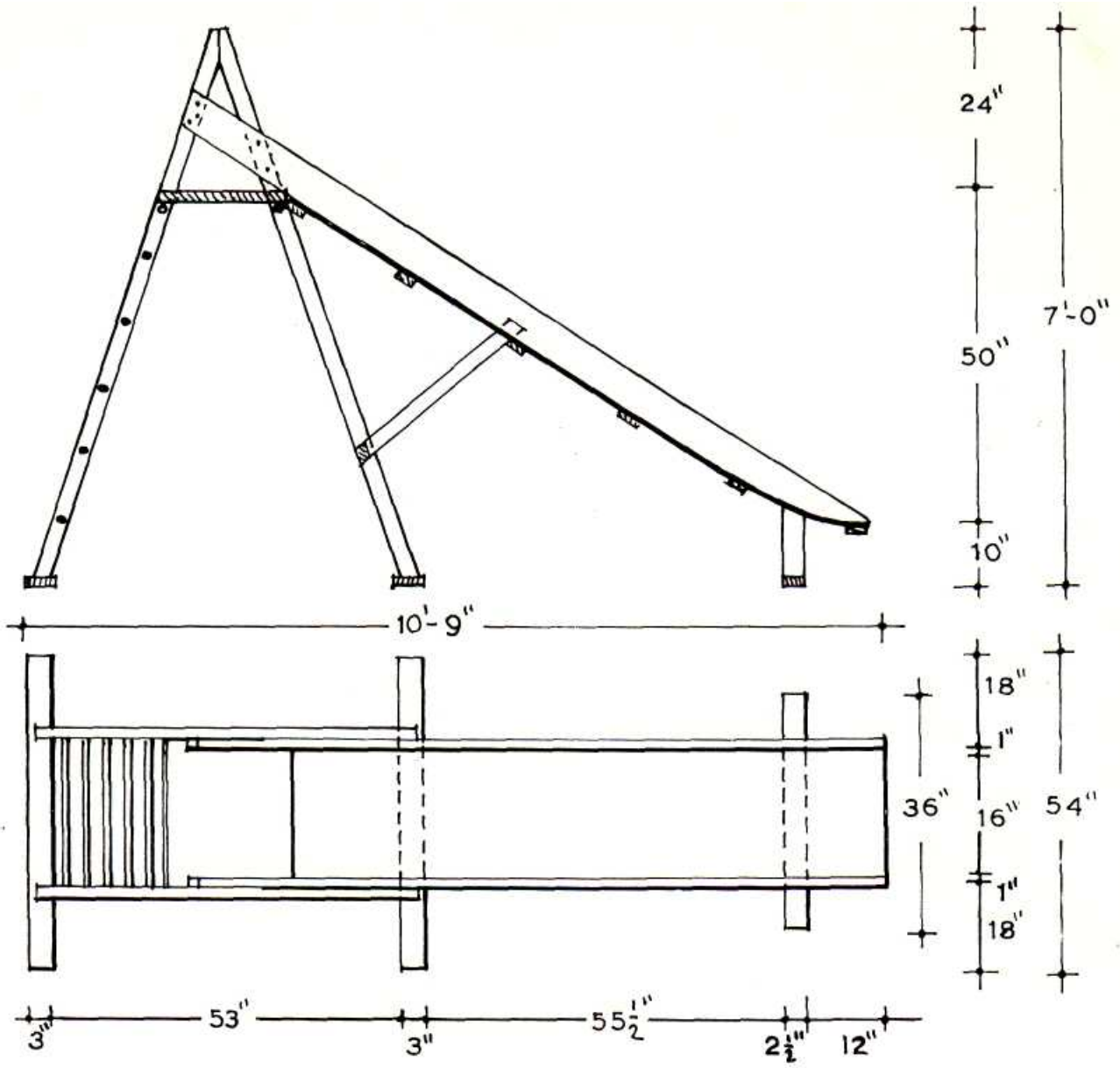
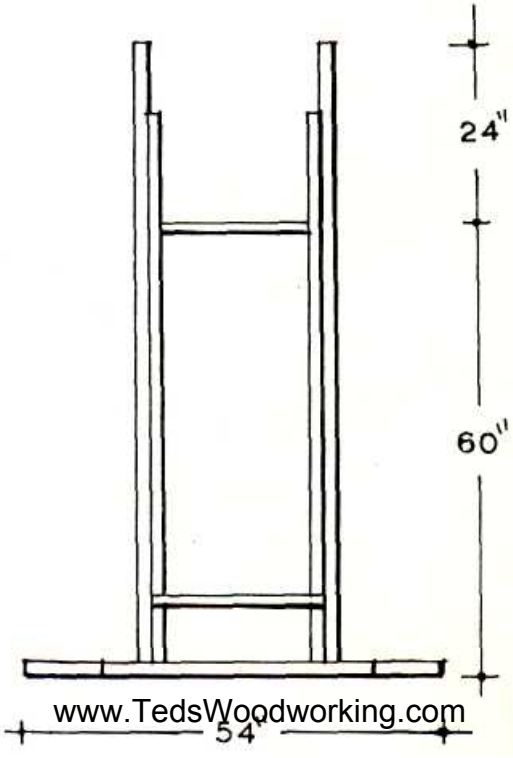


Instructions for Assembly

1. Join dowels (F) with supports (A).
2. Fasten supports (A) together with bolts and attach bottoms (C) and panel (B).
3. Attach panel (G) and support (J) to sides (H) and fasten latter to supports (A).
4. Fasten supports (L) to bottom (K) and sides (H).
5. Join supports (D) with cross rail (E) and supports (A) and sides (H).
6. Apply finish.



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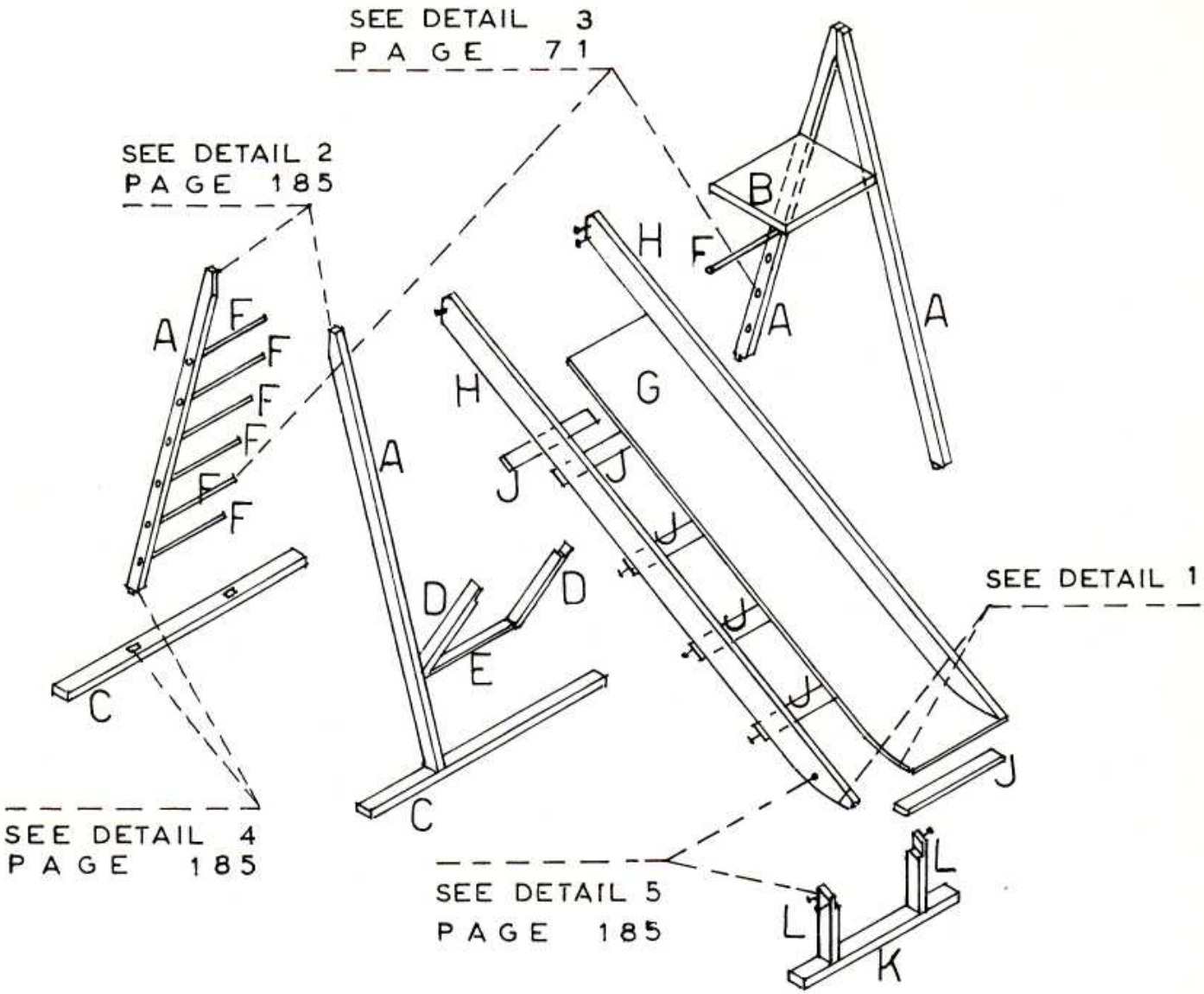

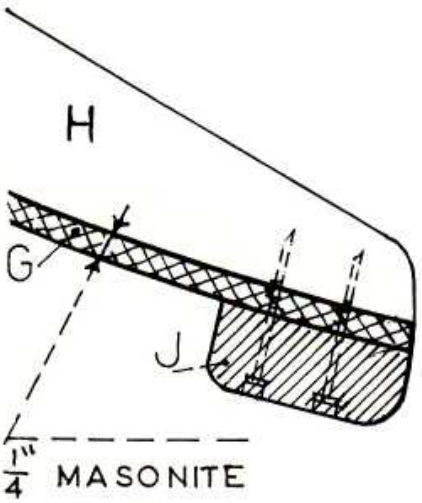

DETAIL 1

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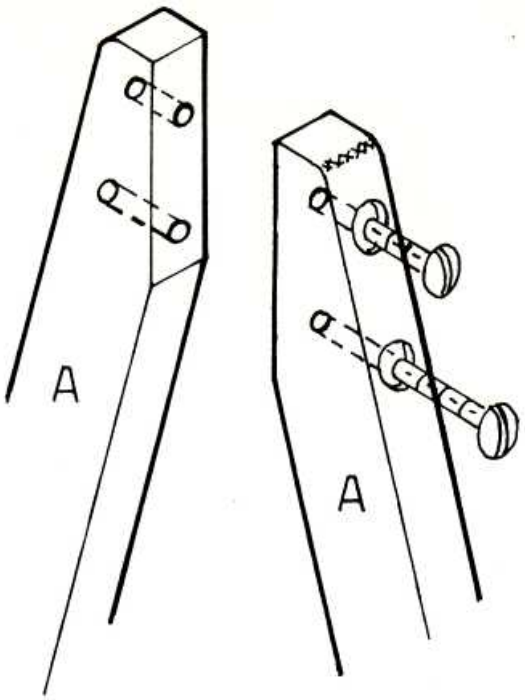

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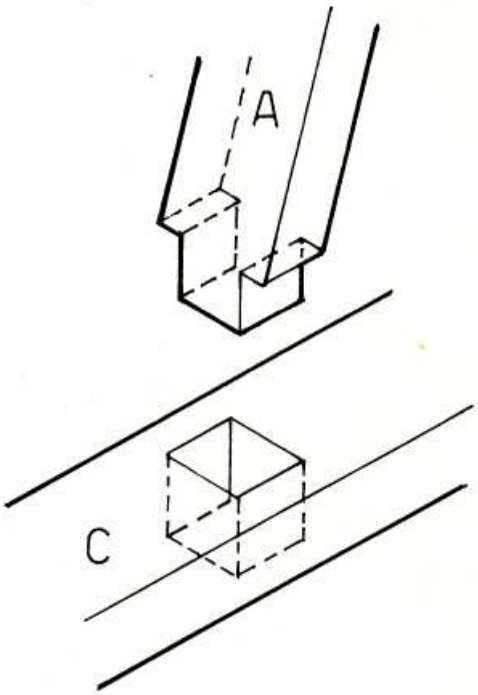

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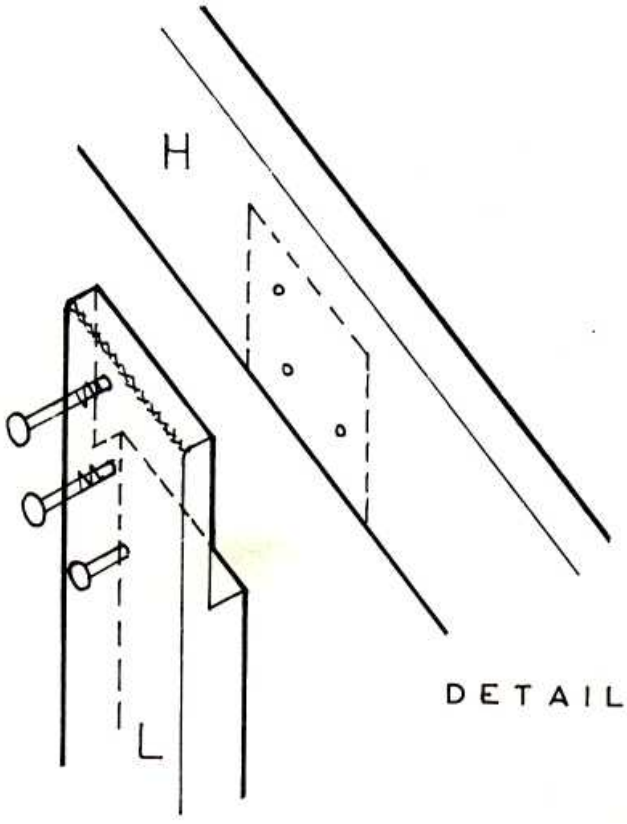

DETAIL 5

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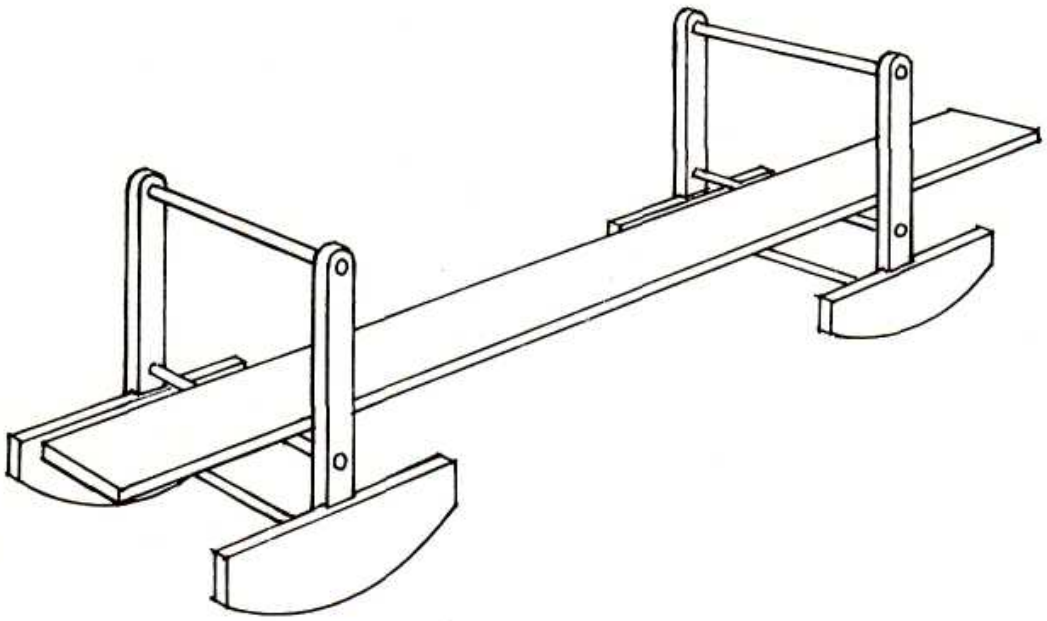
7.12 ROCK 'N ROWBOAT

Less nautical-looking than the boat of Project 7.2, this unit is bigger and affords more action per childpower. With a series of coordinated pushes and pulls the rock 'n rowboat can be made to "walk" along the ground, which is great fun even when the boat comes apart. The board is not fastened to either end, making storage a simple matter.



List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length		
A	4	sides	1	7	21
B	4	rails	1	2	26
C	6	dowels	1 diam.		19
D	1	plank	1	9	90

Instructions for Assembly

1. Join sides (A) with rails (B).
2. Fasten dowels (C) in sides (A) and rails (B).
3. Apply finish and insert plank (D) without fastening.

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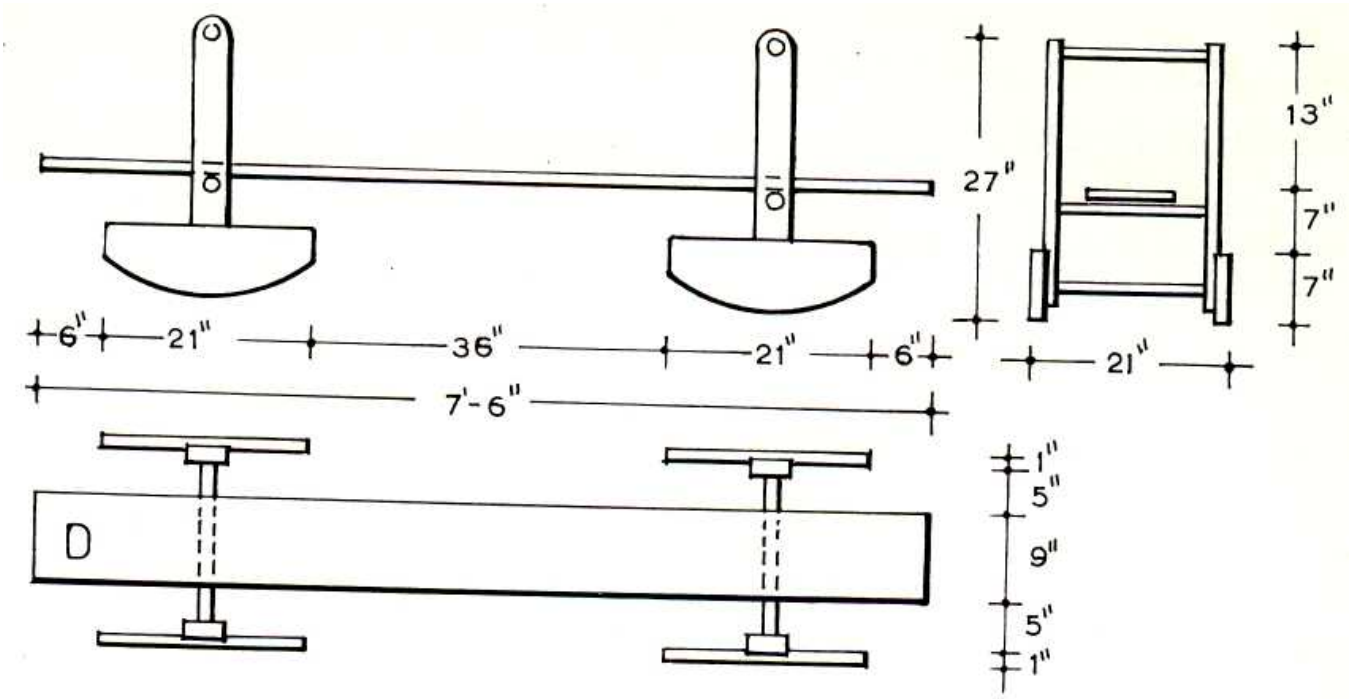

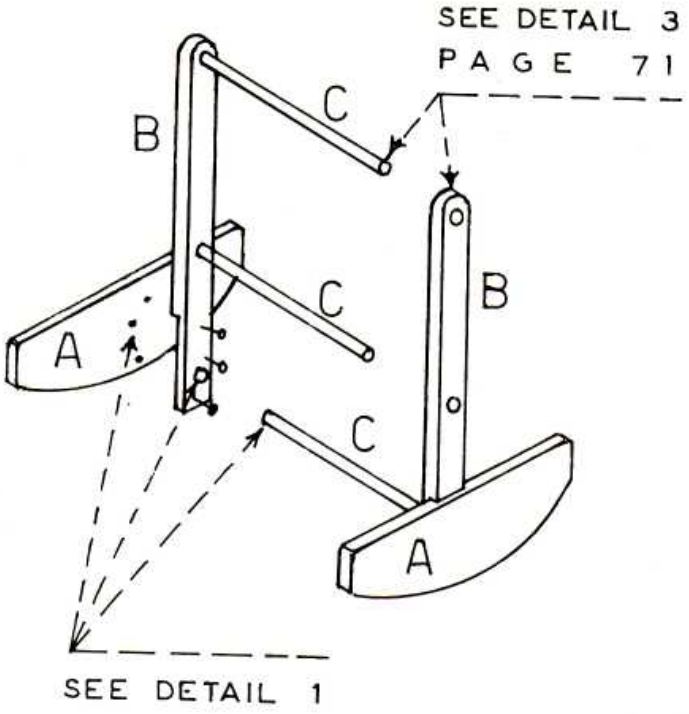

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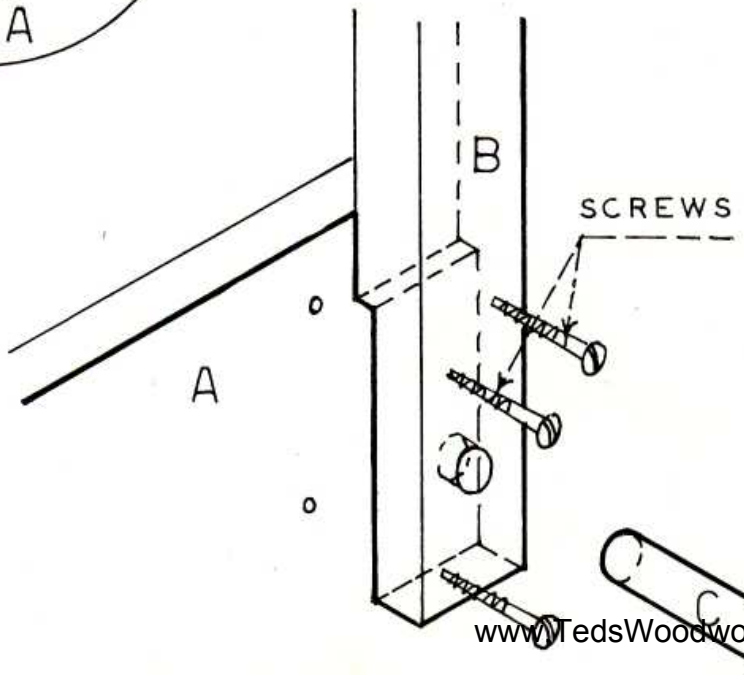

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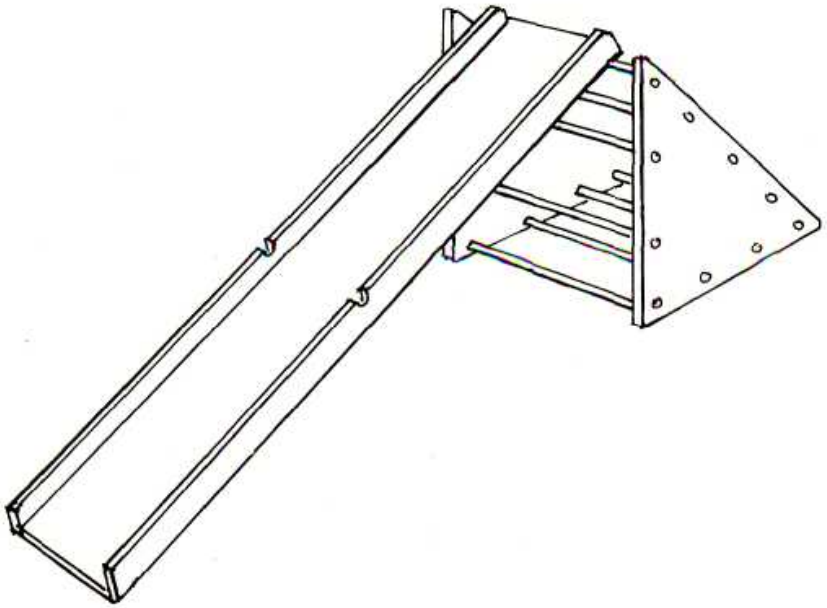
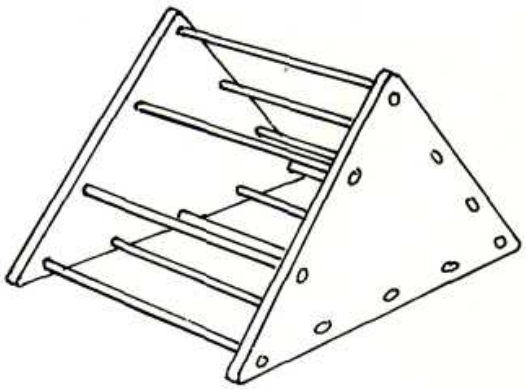
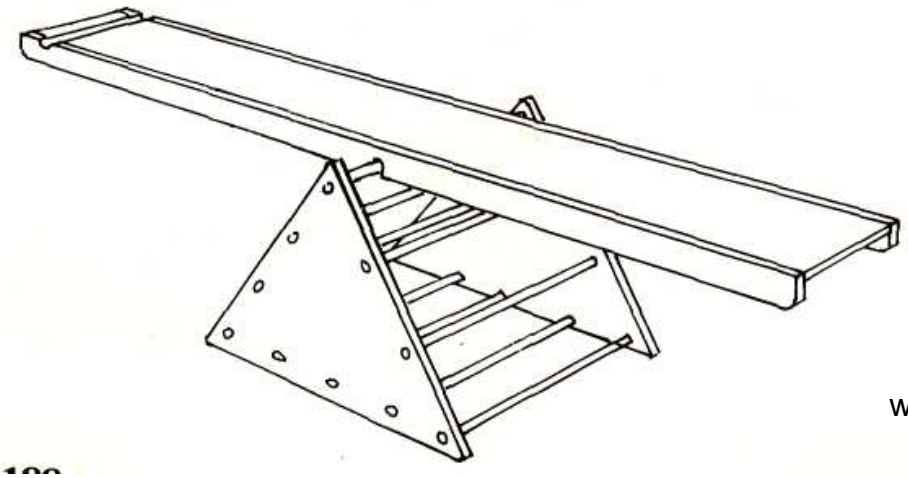
7.13 COMBINATION SLIDE, SEESAW AND LADDER

Ingenious and versatile, for indoors and out, this final project will give you the greatest return for your efforts in terms of sheer fun. Here is one item that can be "handed down" as the family increases, and it's not likely to wear out with reasonable care. Easy to make, easy to carry, easy to store, it's the answer to the baby-sitter's problem of how to entertain Junior.







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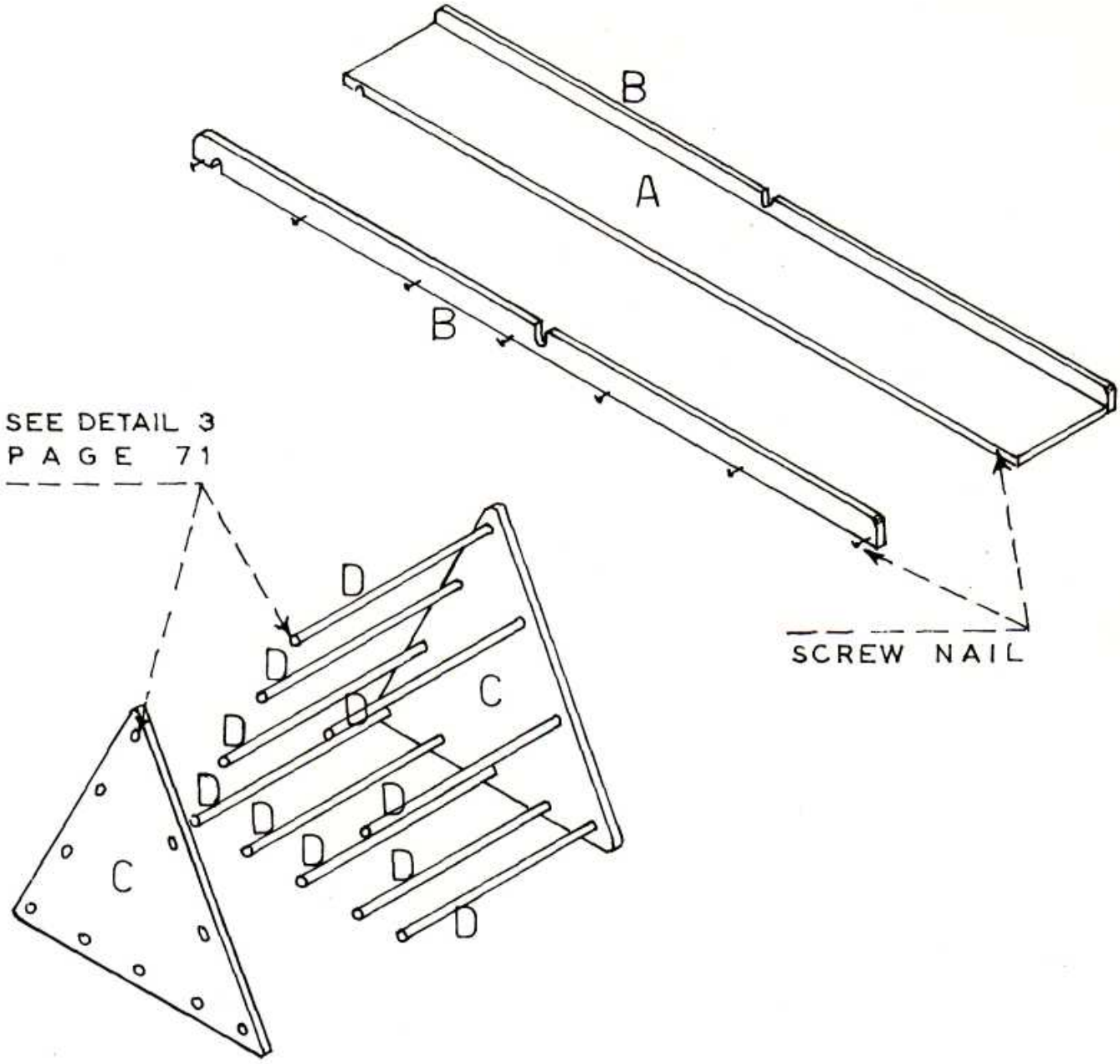

List of Materials

PART	NO.	FUNCTION	DIMENSION IN INCHES thickness × width × length
A	1	plank	¾ × 12 × 72
B	2	sides	1 × 2¾ × 72
C	1	panel cut diagonally to form two triangles	¾ × 27 × 27
D	10	dowels	1 diam. × 20

Instructions for Assembly

1. Fasten plank (A) to sides (B).
2. Join dowels (D) with sides (C).
3. Apply finish. *Note:* Make sure groove on back of slide is fitted over dowels when plank is used for either slide or seesaw.

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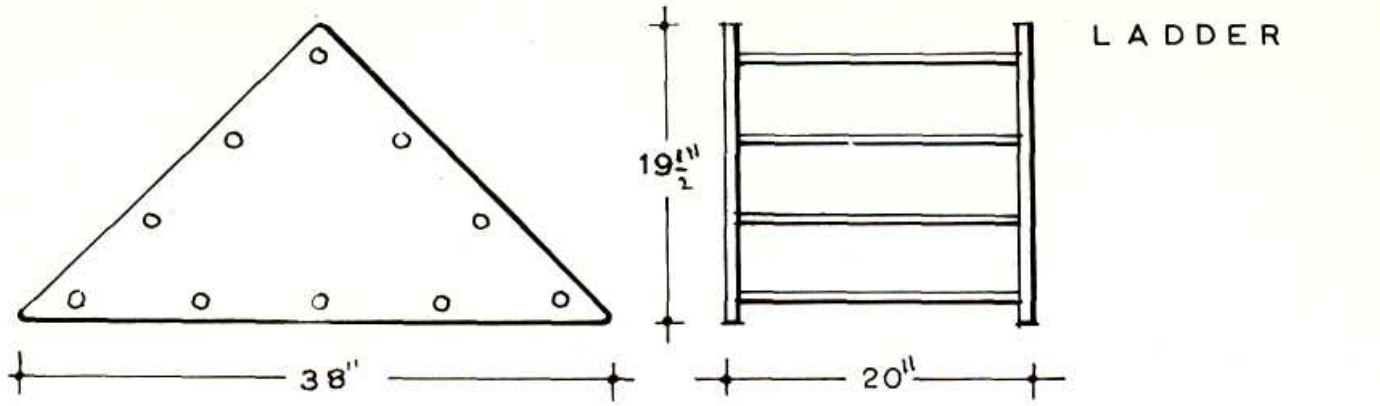

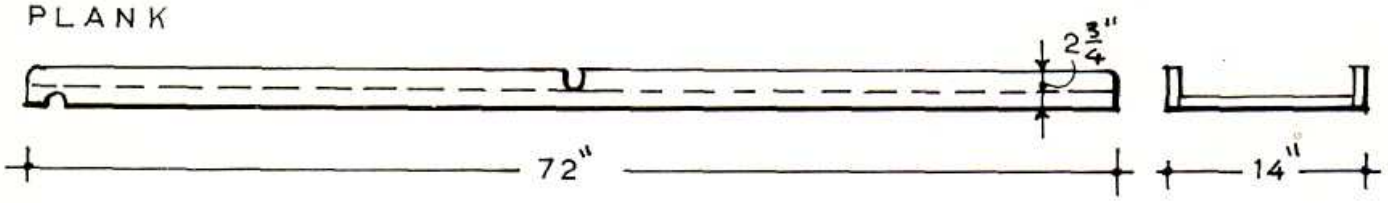

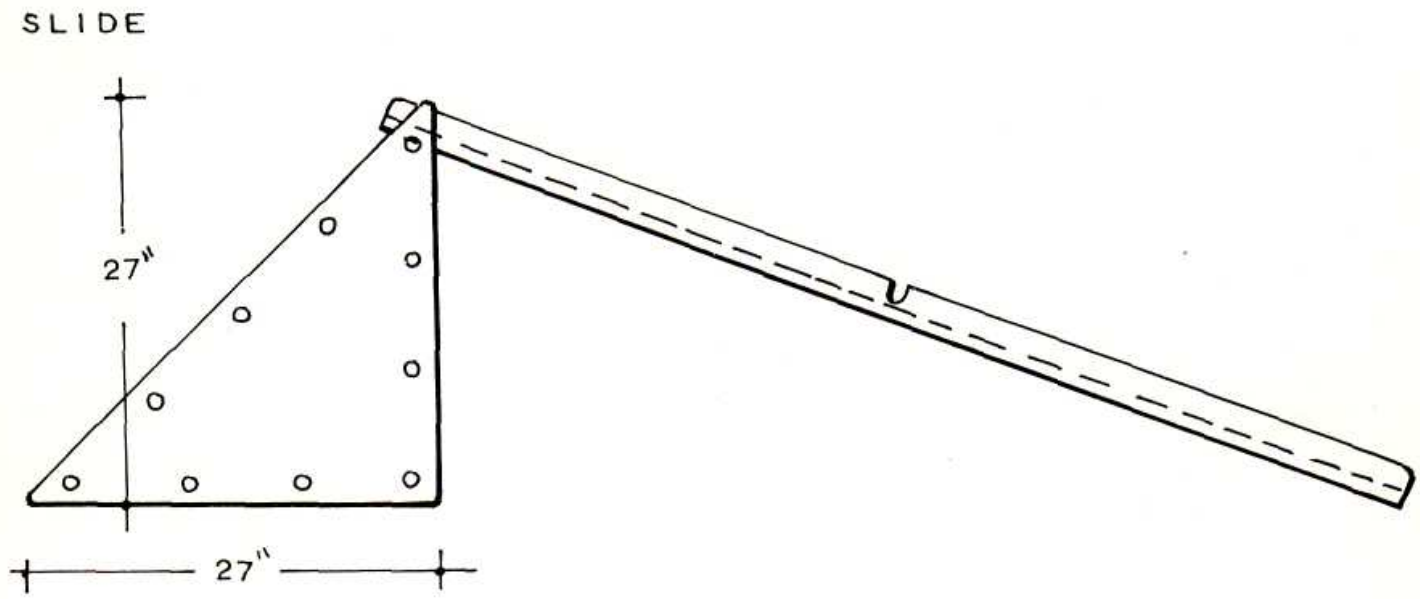

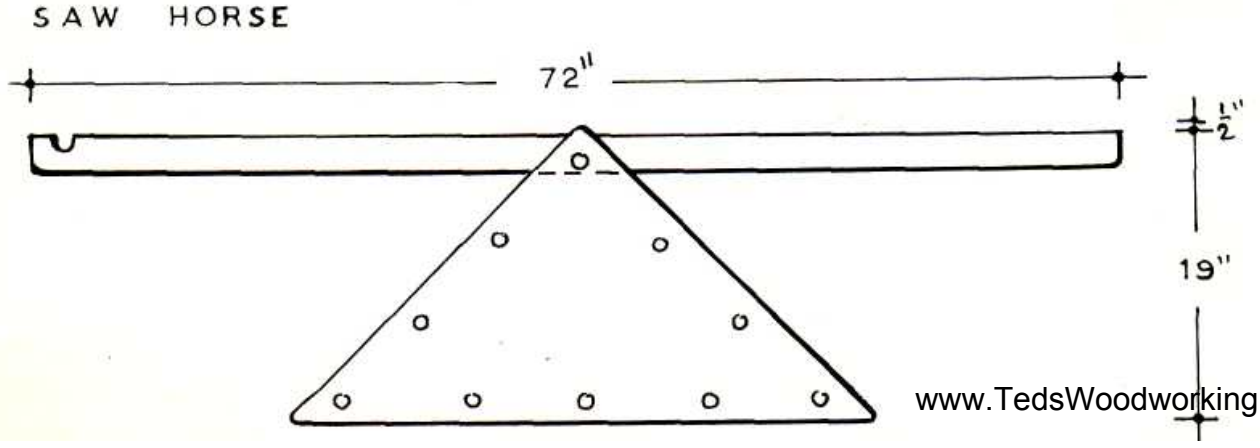

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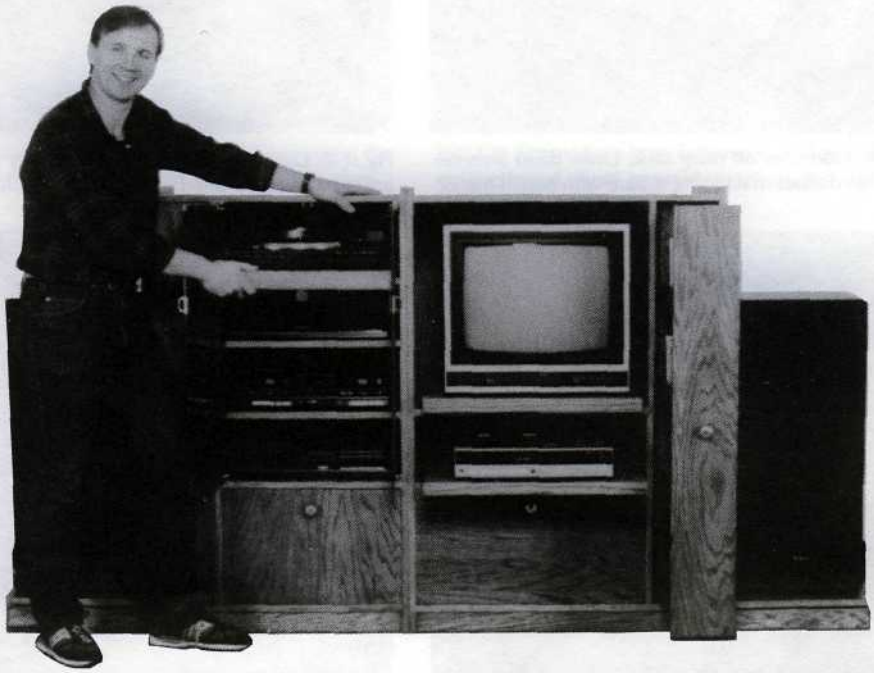
All-In-One Entertainment Center



BEFORE YOU START this project, read the instructions carefully to familiarize yourself with what is involved. Check the sizes of the component shelves; your equipment may require more space. Change the dimensions accordingly. You will find it a pleasure to organize your home electronics in these handsome cabinets made of oak veneers. The larger unit holds a TV and VCR and has a storage compartment. To the right, a narrow vertical drawer stores video cassettes, stacked on the shelves so the labels can be easily read.

The TV rests on a pullout shelf which swivels, enabling the screen to be directed toward the viewer. The VCR rests on a pullout platform to accommodate top loading units. The audio equipment unit has four shelves, three of which are adjustable in 1-inch increments to accommodate components of varying heights. The top shelf has a pullout platform for a turntable.

The softly tinted glass doors keep out the dust and add to the appearance of the piece. Special hardware is used, eliminating the need for drilling the glass. A second vertical drawer, on the left, stores

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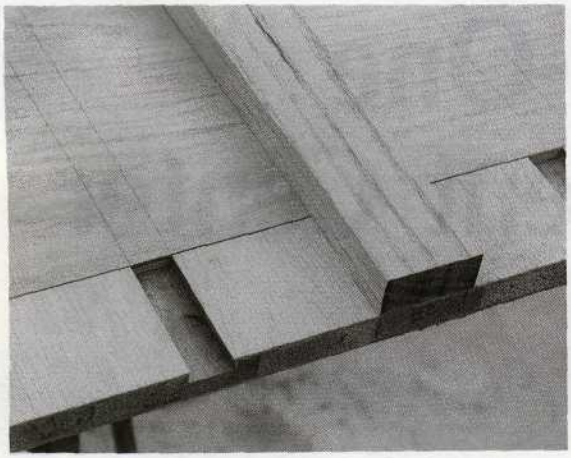

Fig. 1-1. Mark dado sites on story stick. Draw dado lines on board then align dadoes of dadoing square with pencil marks.

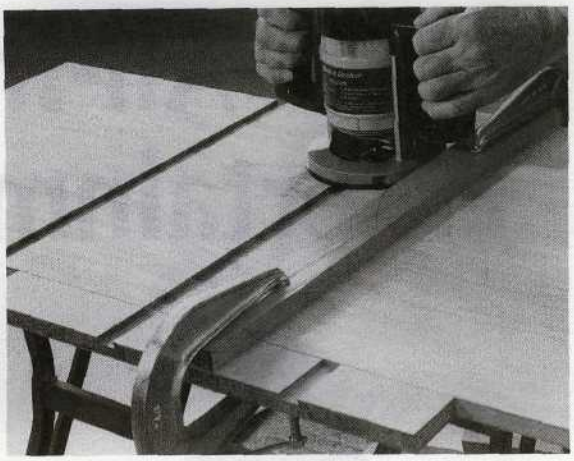

Fig. 1-2. Dadoing square is clamped into place then dadoes are cut with router fitted with ¾-inch bit. Clean burr at corners.

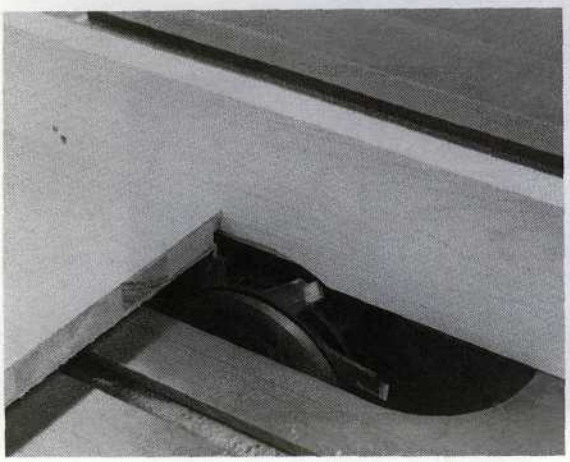

Fig. 1-3. The dado blade is made to cut slightly into the auxiliary wood fence. Set blade and fence to make ¼×⅜ rabbet.

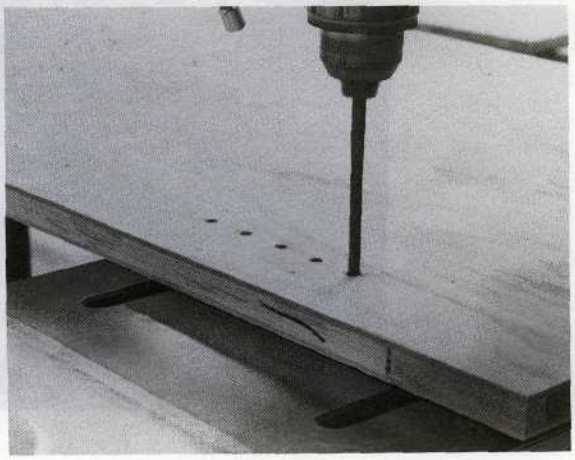

Fig. 1-4. Locate shelf support holes then use awl to mark centers for drill bit. Drill ¼-inch shelf support holes ⅜ deep.

audio cassette tapes. The bottom pull-out compartment holds record albums. Five metal dividers hold the records in small easy-to-manage groups.

Two base pieces are used for the speakers, one at each end. Each has a swivel platform to position speakers for the best acoustical results. Except for some solid lumber used for trim, construction is entirely of plywood: ¾ inch for the cabinets and ¼ inch for the rear panels. Oak was used for the project in the photo but other wood species may be substituted. Most joints are dadoed and glued, reducing the number of fasteners used.

Plywood is available in either veneer core or lumber core. You might prefer lumber core because it can be used without edging in some cases. It has a wide center band which can be sanded smooth and will take a finish far superior to the veneer core which must always be edged. For example, the vertical drawer fronts, the album drawer front and the storage

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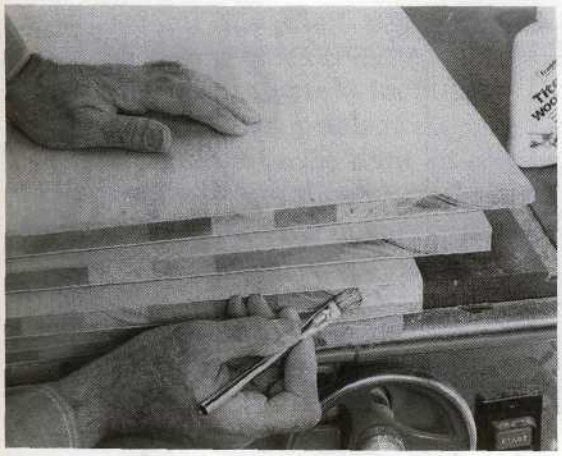

Fig. 1-5. Rough-assemble cabinet parts for fit. Glue sizing the edges of plywood panels with diluted aliphatic resin glue.

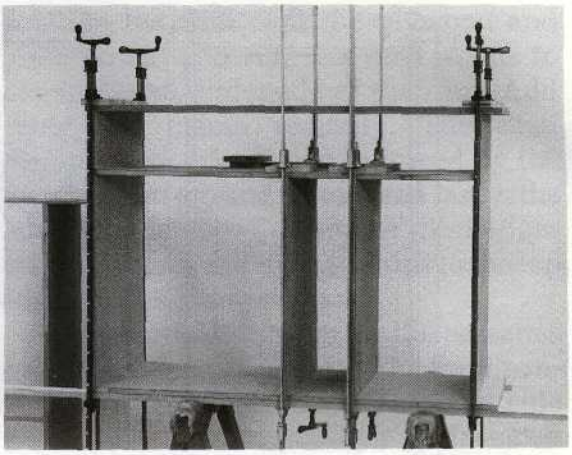

Fig. 1-6. Aprons have been fastened with glue and screws, holes counterbored. Final assembly is glued and clamped.

compartment door did not need to be edged.

Regardless of the plywood used, we recommend that your table saw and radial arm saw be fitted with a plywood blade because of the smooth cut it produces. The materials list shows the actual cut sizes of the various parts. The overall measurements will be greater because of the edging which is added after assembly in most cases.

Set the saw fence to rip the 19-inch widths of the sides, top and bottoms, then reset the fence to rip the dividers and fixed shelves which are 18¾ inches wide to allow clearance for the rear panel. The lengths of each piece are then cut to size. If your components require wider shelves, make the necessary adjustments in the measurements at this time.

The dadoes should be cut with a router fitted with a ¾-inch cutter, preferably carbide. To ensure accuracy and to simplify dadoing, make up a dadoing square. This consists of a piece of hard wood with crosspieces fastened at each end. You can also make it with just one crosspiece. Regardless of the design, the members must be perpendicular. Assemble with glue and screws. After the glue sets, clamp the jig to a piece of scrap and cut a dado into the crosspiece. The depth of cut should be ¼ inch.

Mark the location of each dado on all boards, then position the jig so its dado lines up with the dado marks on the board. Clamp securely then cut the dado. Position clamps at both ends of the jig, but so they won't obstruct the travel of the router.

When all the dadoes have been cut, clean the corners with sandpaper. A 1-inch dowel wrapped with 220-grit paper works fine to remove the burr.

After cutting the dadoes, rabbet the rear edges of the side, top and bottom members. Make the rabbet ¼ inch deep and ⅜ inch wide using a router, or on the table saw using a dado blade. If the table saw is used, clamp a wood auxiliary fence to the saw fence so you can run the dado right up to the fence. Actually, you should let the dado blade bite into the wood fence slightly to assure you of a good clean cut. The divider and side panel of the audio cabinet

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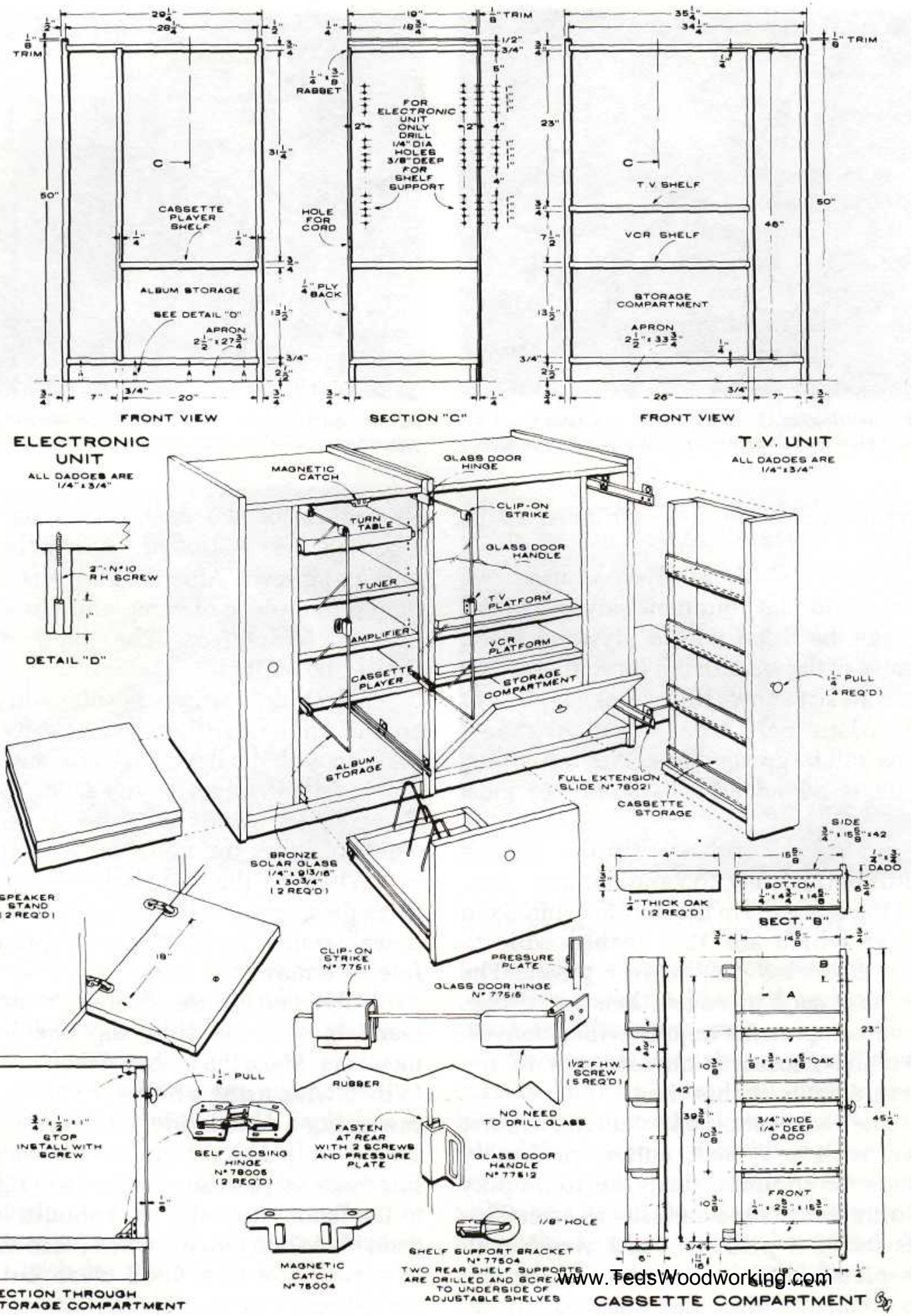
FRONT VIEW
SECTION "C"
FRONT VIEW
ELECTRONIC UNIT
ALL DADOES ARE 1/4" x 3/4"
T.V. UNIT
ALL DADOES ARE 1/4" x 3/4"
DETAIL "D"
2" - N°10 R.H. SCREW
MAGNETIC CATCH
GLASS DOOR HINGE
CLIP-ON STRIKE
TURN TABLE
GLASS DOOR HANDLE
TUNER
T.V. PLATFORM
AMPLIFIER
VCR PLATFORM
CASSETTE PLAYER
STORAGE COMPARTMENT
ALBUM STORAGE
FULL EXTENSION SLIDE N° 7802
CASSETTE STORAGE
1/4" PULL (4 REQ'D)
SPEAKER STAND (2 REQ'D)
BRONZE SOLAR GLASS 1/4" x 9 13/16" x 30 3/4" (2 REQ'D)
1/4" THICK OAK (2 REQ'D)
BOTTOM
SECT. "B"
CLIP-ON STRIKE N° 77511
PRESSURE PLATE
GLASS DOOR HINGE N° 77516
RUBBER
1 1/2" F.H.W. SCREW (5 REQ'D)
NO NEED TO DRILL GLASS
1 1/4" PULL
3/4" x 1/2" x 1" STOP INSTALL WITH SCREW
SELF CLOSING HINGE N° 78006 (2 REQ'D)
FASTEN AT REAR WITH 2 SCREWS AND PRESSURE PLATE
GLASS DOOR HANDLE N° 77512
1/8" HOLE
MAGNETIC CATCH N° 75004
SHELF SUPPORT BRACKET N° 77504
TWO REAR SHELF SUPPORTS ARE DRILLED AND SCREWED TO UNDERSIDE OF ADJUSTABLE SHELVES
SECTION THROUGH STORAGE COMPARTMENT
SIDE VIEW
CASSETTE COMPARTMENT
3/4" WIDE 1/4" DEEP DADO
FRONT
1/8" x 3/4" x 14 5/8" OAK
SIDE
BOTTOM
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are drilled for the shelf peg supports. Locate the ¼-inch holes as indicated in the drawing and drill them ⅜ inch deep.

The main cabinet members can now be assembled. This must be done in stages. The sequence is as follows: 1) shelf (or shelves) to the divider; 2) divider to top and bottom members; 3) sides to top and bottom.

Before assembly, glue-size the edges of the shelves and tops and bottoms. Do this by diluting the glue with water. Brush on and allow to dry (about 15 minutes), then sand lightly. Now apply the glue full-strength and assemble in the sequence outlined above. Use cauls under the clamps to prevent damage to the workpiece. Make sure the pieces are perpendicular after the clamps have been applied. Allow the glue to set then add the next section. The sides are added in the final assembly.

The edging can now be added to the exposed edges of the front and top. Use solid oak that has been dressed to a thickness of ¾ inch. This will require greater accuracy when applying, but it will mean far less work later. If you use 13/16-inch stock, it will be easier to apply, but then the overhang will have to be trimmed. Take your choice.

Rip the stock to a width of ⅛ inch, on the table saw. Set the fence ⅛ inch away from the blade then lock securely. Push the piece through the saw blade using a push stick. Glue the ⅛-inch trim to the plywood edging using double-pointed brads. To use the nails, grasp them with the pliers and force them into the plywood edges, spaced about 8 inches apart. Push them until about 1/16 inch protrudes.

Starting with the side members, apply glue to the plywood edge and to the undersides of the oak edging. Carefully position the trim over the plywood and press down, allowing the brad points to penetrate the underside of the trim. Add cauls and clamp securely. The shelf members are edged next followed by the divider, then top and bottom and lastly, the other side member. After the front edges are completed, add the two strips to the top edges of the side panels.

The vertical drawers for the cassettes are of simple construction. The front panel is dadoed to take the bottom and side panels. The rear and bottom are fastened with butt joints. When fastening the cassette shelf supports, use two spacer blocks to obtain the proper spacing. Make the blocks 4 × 10⅜ inches and place them at the sides of the opening starting at the bottom. Apply glue to the back of the 14⅝-inch support and, resting it on the blocks, fasten to the panel. Add the 4-inch side pieces then repeat for the next shelf working upward.

The shelves are made of ¼-inch oak plywood. The top of the front members are edged with solid oak. Cut ¼- × -¼-inch strips on the table saw and glue them carefully to the top edge of the shelf fronts. Here the double pointed nails are almost a necessity. You can make a simple clamping jig as shown in the photo. This is far better than trying to use clamps on such a thin piece. The same jig is used to edge the ¼-inch plywood of the turntable bases. Simply insert the glued-up stock against the backboard, then insert the wedges and tap them gently until the joint closes tightly. Do not wipe away any glue that squeezes out. Let it dry then scrape off and sand later.

When assembling the shelves, note that three have the fronts extending from the left and three from the right. This is

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Fig. 1-7. Sand cabinet with care. Close-up view of doublepointed nails. For ⅛-inch edging, let point protrude ⅛ inch.

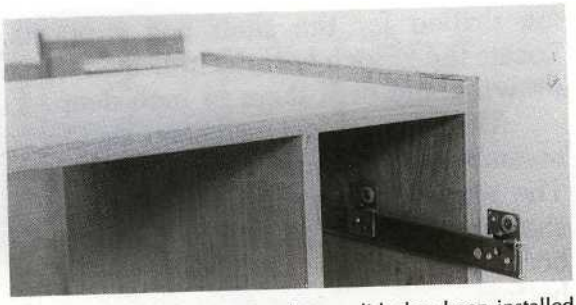

Fig. 1-8. Upper full-extension drawer slide has been installed into cassette compartment. Use slotted holes.

Fig. 1-9. The TV swivel is installed onto fixed shelf and platform is mounted into sides using access holes predrilled.

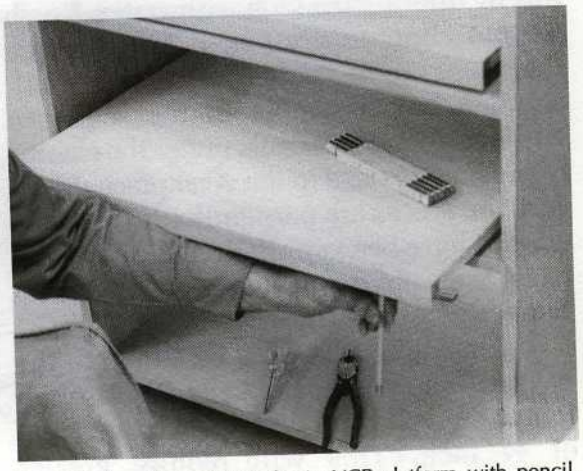

Fig. 1-10. Locating screw holes in VCR platform with pencil. Use awl to make screw pilot hole. Mount door spring hinge.

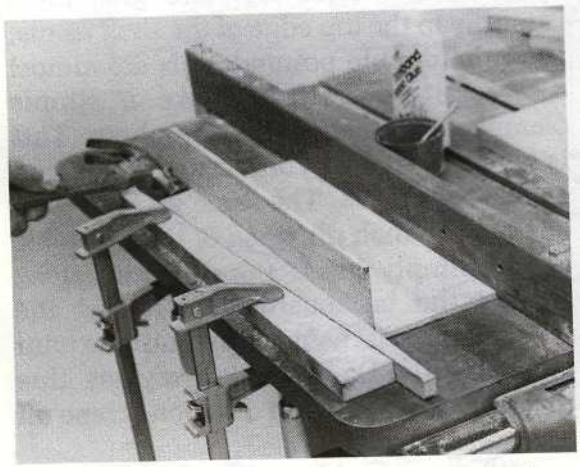

Fig. 1-11. Simple gluing jig for the ¼-inch shelves. Saw fence is used as a backstop. Tap wedge to tighten joint. Sand cabinet.

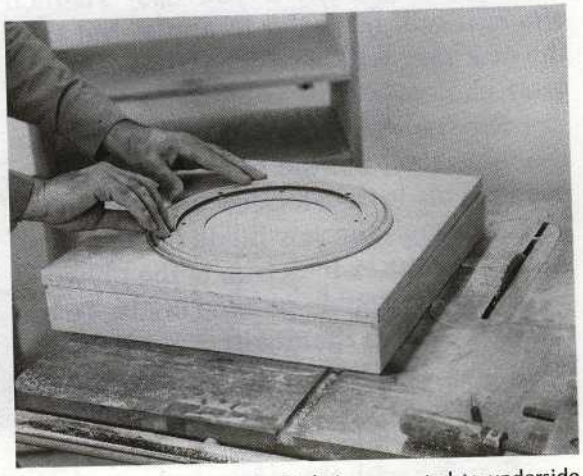

Fig. 1-12. Speaker base swivel is being mounted to underside of swivel top. Remove the swivel top before applying finish.

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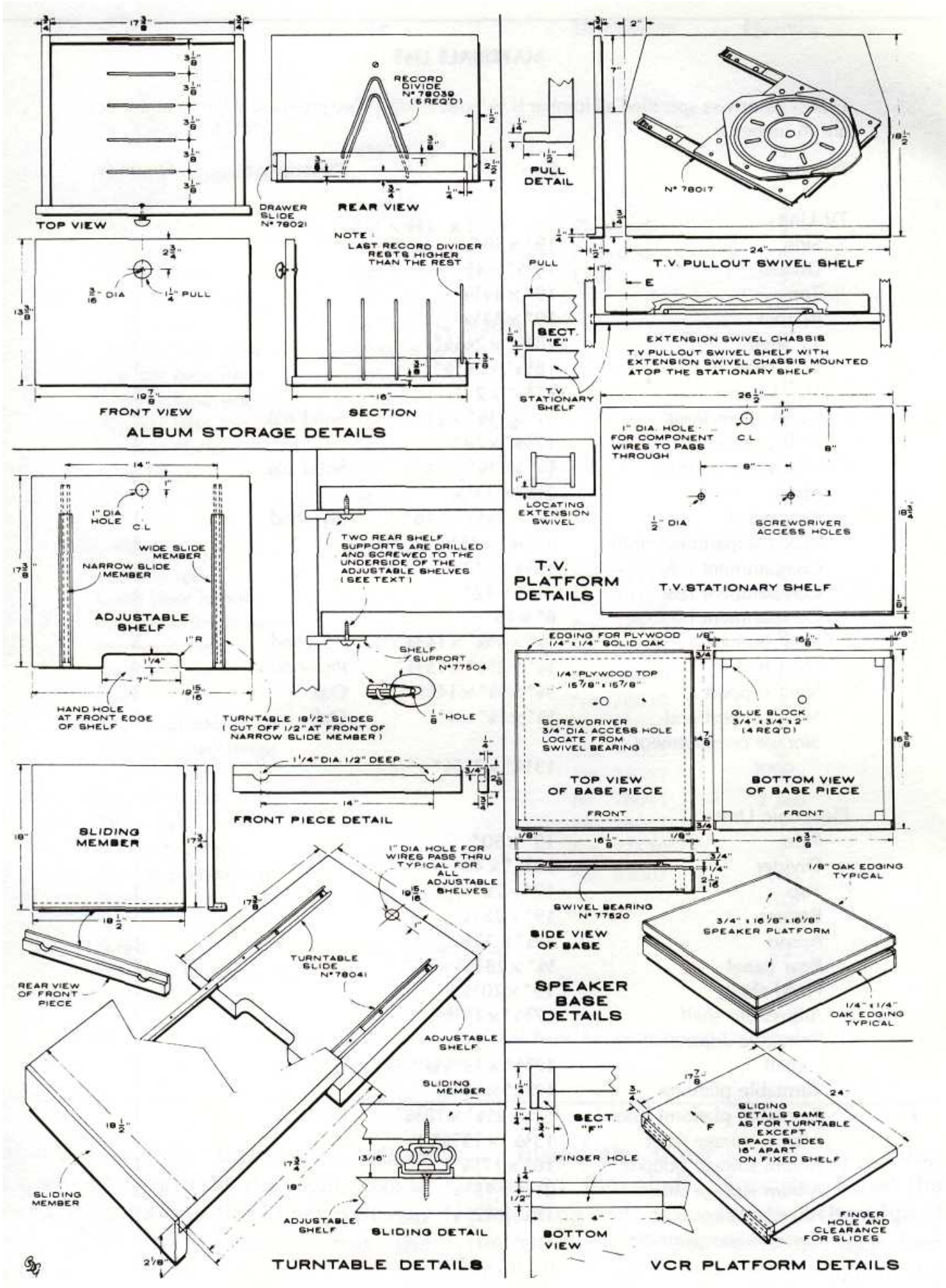

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MATERIALS LIST

Unless otherwise specified all lumber is ¾" oak lumber core plywood. All measurements are in inches.

Purpose	Size	Description	Quantity
TV Unit			
Side	19" × 50"		2
Divider	18¾" × 46"		1
Top	19" × 34¼"		1
Bottom	19" × 34¼"		1
TV shelf	18¾" × 26½"		1
VCR shelf	18¾" × 26½"		1
TV platform	17¾" × 24"		1
TV platform front	¾" × 1½" × 24"	Solid oak	1
VCR platform	17⅞" × 24"		1
VCR platform front	¾" × 1¼" × 24"	Solid oak	1
Apron	2½" × 33½"		1
Rear panel	¼" × 34⅜" × 46"	Plywood	1
VCR compartment front	6 13/16" × 45¼"		1
Compartment side	15⅝" × 42"		1
Compartment rear	4¾" × 42"		1
Compartment bottom	6" × 18"		1
Shelf bottom	¼" × 4¾" × 14⅝"	Plywood	3
Shelf front	¼" × 2⅝" × 15⅜"	Plywood	4
Shelf support	⅛" × ¾" × 14⅝"	Oak	3
Shelf support end	⅛" × ¾" × 4"	Oak	6
Storage compartment door	13¼" × 25⅞"		1
Electronic Unit			
Side	19" × 50"		2
Divider	18¾" × 46"		1
Top	19" × 28¼"		1
Bottom	19" × 28¼"		1
Apron	2½" × 33¾"		1
Rear panel	¼" × 28⅜" × 46"		1
Fixed shelf	19" × 20½"		1
Adjustable shelf	17¾" × 19 15/16"		2
Turntable adjustable shelf	17⅜" × 19 15/16"		1
Turntable platform	17¾" × 18½"		1
Turntable platform front	¾" × 2⅛" × 18½"	Oak	1
Album storage front	13⅜" × 19⅞"		1
Album storage bottom	16" × 17⅞"		1
Album storage side	2½" × 15¾"		2
Album storage rear	1¾" × 17⅜"		1
Cassette compartment front	6 13/16" × 45¼"		1

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Purpose	Size	Description	Quantity
Cassette compartment side	15⅝" × 42"		1
Cassette compartment rear	4¾" × 42"		1
Cassette compartment bottom	6" × 18"		1
Shelf bottom	¼" × 4¾" × 14⅝"	Plywood	3
Shelf front	¼" × 2⅝" × 15⅜"	Plywood	4
Shelf support	⅛" × ¾" × 14⅝"	Oak	3
Shelf support end	⅛" × ¾" × 4"		6
Glass door	¼" × 9 13/16" × 30¾"		2
Speaker base front	2 1/16" × 16⅛"		2
Speaker base front	2 1/16" × 16⅛"		2
Speaker base side	2 1/16" × 14⅞"		4
Speaker base top	¼" × 15⅞" × 15⅞"		2
Speaker platform	16⅛" × 16⅛"		2
Glue block	¾" × ¾" × 2"		8
Solid oak trim	¾" × 12" × 8'		1
Miscellaneous			
Glass hinge		No. 77515	4
Glass door handle		No. 77512	2
Clip-on strike plate		No. 77511	2
Magnetic catch		No. 75004	1
Shelf support		No. 78040	6
Pull		No. 78038	4
Record divider		No. 78039	5
Spring loaded hinge		No. 78005	2
Drawer slide		No. 78021	3 sets
Turntable slide		No. 78041	2 sets
TV swivel		No. 78017	1
Swivel bearing		No. 77520	2
Double pointed nail		No. 83007	100
Screw	1½"—8 FH		10
Screw	2"—10 RH		6
Screw (for glass hinges & rear panels)	½"—6 Pan head		62

Note: The miscellaneous hardware items are available from Armor Products. The numbers shown are from the Armor catalog.

because the cassette drawers are mirror opposites. Apply glue to the front edge of the shelves and along the lower part rear of the shelf front. Again, use the double pointed brads and clamp in the jig.

Install the three shelves by gluing them to the shelf supports. Glue the projecting ends of the fronts to the edge of the rear panel. The lower front piece does not have a shelf. It rests on the floor of the

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drawer. Just use a glue block at the corner opposite the projecting part, and lay a bead of glue along the bottom edge.

The album drawer had a full-size front panel but the sides and rear are only 2½ inches high. This allows easy access to the albums: Cut ¼- × -¾-inch rabbets at the bottom of the front and side panels, then drill the 3/16-inch holes for the record dividers. The one set of holes made in the rear panel will make that divider stand higher than the rest. This will have no effect on the storage of the records. If you like, you can drill these holes deeper so the last divider will be even with the rest.

The adjustable shelves are made as shown. The two lower ones for the audio cabinet are identical. Cut them to size then add the ⅛-inch oak trim to the fronts. The notch at the front of the turntable shelf serves as a hand hole. Add ⅛-inch trim at the front edge then round off the corners with the router.

All three shelves should be drilled at the rear with a 1-inch hole. This will allow access for the component cables. The turntable shelf has a 2⅛-inch-deep front to conceal the shelf and slide hardware. Note that two mortises are required at the rear edge of the front piece, allowing clearance for the slide hardware.

The TV platform rests on the pull-out swivel which in turn rests on the fixed shelf. The platform has a 1½-inch oak front which is rabbeted along its length. The rear of the shelf is clipped diagonally to allow clearance for the shelf to turn either in its retracted or extended position. A suitable hole (1 inch diameter) should be drilled into the rear of the fixed TV shelf. This will allow cables to pass through from the VCR. Two screwdriver holes are also drilled into the fixed shelf as shown. These are needed to install the sliding track.

The VCR platform also pulls out to allow easy access to the top of the VCR. The platform has a ¾- × -1¼-inch oak front with finger grips at each end. These notches also serve as clearance for the movable part of the sliding hardware.

This door is a plain rectangle with the edges exposed. (If you used veneer core plywood, the edges should be trimmed with ⅛-inch oak edging.) Instead of opening sideways, this door drops down. The spring-loaded hinges serve as dropleaf supports and the springs allow it to self-close when it is raised. They eliminate the need for catches. All that is required is a stop block under the VCR shelf. The nice part about using these hinges is that they allow the door to set in ⅛ inch.

The glass doors are installed with the special hinges which eliminate the need to drill the glass.

The speaker bases consist of the base part and the movable top which turns on 12-inch swivels. Make the base sides and ends of plywood and use oak edging for the exposed end pieces. The top is covered with ¼-inch oak plywood with edges trimmed in ¼- × -¼-inch oak. Use the gluing jig to fasten the trim. The tops are made of ¾-inch plywood edged with ⅛-inch oak.

The rear panels are made to fit into the rabbeted parts of the cabinet. Drill the necessary holes for cords and cables then install with screws.

The adjustable shelf support pegs are drilled to take screws. The screws are installed after the shelves are in place. They prevent the shelves from moving toward the glass, but more important, they prevent

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the turntable platform from tilting when it is extended.

The turntable's movable slide members must be shortened about ¾ inch. Use a hack saw and cut off the front ends. If you cut away one of the screw mounting holes, redrill about 1 inch from the end. Install the slides with wood screws. The TV turntable is mounted with its fixed track 1 inch from the front of the shelf. The access holes are used to fasten the movable track to the underside of the platform.

The storage compartment is mounted with spring-loaded hinges. Support the free end of the door on blocks and butt the bottom edge against the front edge of the cabinet. Center the door from side to side, then position the hinges and mark the hole locations. Use screws only in the slotted holes then try the door. If okay, install the rest of the screws.

The left cassette drawer uses two lefthanded tracks and slides. The right hand door uses the right hand set. The lower set should be installed ⅛ inch above the bottom panel. The fixed track should be placed as far back as possible so the drawer fronts set in ⅛ inch when closed. The album drawer hardware is installed like the cassette drawers, ⅛ inch from the bottom panel.

Install the glass doors with the special hinges. Set the hinges ⅛ inch in from the cabinet frame then mount one in each corner. Insert the pressure plates onto the glass. These have adhesive on one surface. Peel off the protective backing then apply to the glass at the inside corners. The set screws of the hinges are made to bear against these plates. Adjust the glass so that it is properly centered. Install the strike plates at the top of the doors, then install the magnetic catch so that it contacts the back of the strike plates.

The cabinet may be finished by applying a paste wood filler with the desired color (stain) such as a light oak, medium oak or dark oak (Golden Oak). Apply the filler as per the manufacturers instructions then apply suitable sealer and topcoats of lacquer.

Another method of finishing is to use a Danish oil finish. We chose Deftco Danish Oil Finish. Simply brush it on, let stand for 30 minutes, then wipe with clean cloths. The resulting finish is deep, mellow, and long lasting.

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Banjo Wall Clock

THIS BANJO CLOCK doesn't play musi but the sound of its battery-operate movement is pleasing, and it will keep yo well informed of the time. Made of pine the case is not difficult to build. Th moldings are standard and available a lumber yards. The turned finial, decorativ eagle, and clock works can also b purchased.

Using a saber saw or jigsaw, cut th outline of the clock, including th rectangular cutout for the movement. Next shape the edge with a router. If you do no have a router, you can round the edge with sandpaper. A beading cutter was used on the clock shown, but you may prefer an other shape. Note that the shaping i interrupted at several points, (see drawing) Add the molding, attaching it with brad and glue.

At the top, allow the ends to protrude then trim off with a coping saw after th glue has dried. The molding at the neck i mitered. Cut the front piece first, then fi the side sections to it.

To mount the finial, drill a ⅜-inch hole ¾ inch deep into the bottom. Then insert a 1½-inch length of dowel. Drill a corresponding hole into the ¼-inch platform and the top of the case. Also dril a clearance hole at the rear of the case for the hanger.

The eagle was shiny bright when purchased, but it was "antiqued" by spraying it with black paint. Before the

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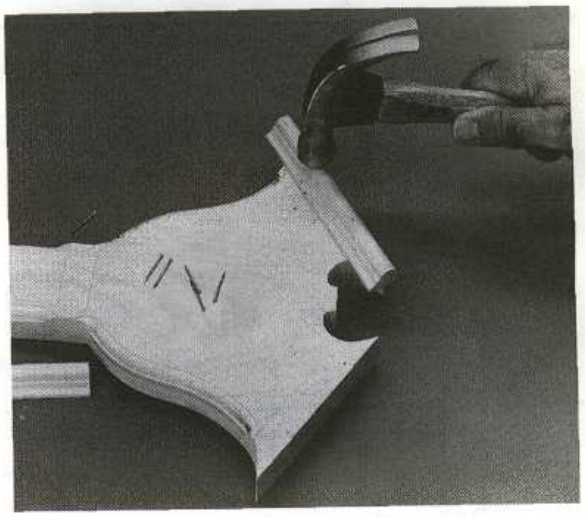

Fig. 2-1. Having cut the case and shaped the edges with a router, attach the molding pieces.

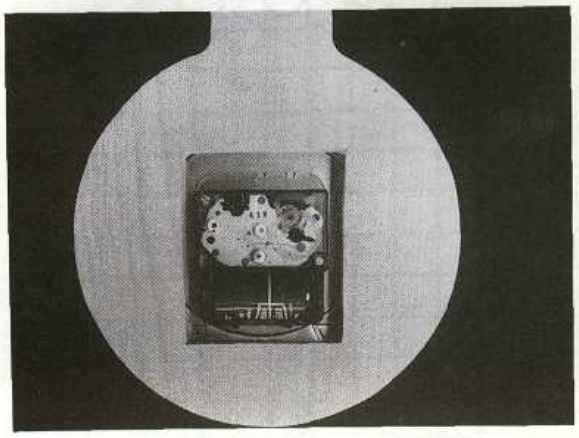

Fig. 2-2. Cut an opening in case to accommodate the clock's battery operated mechanism.

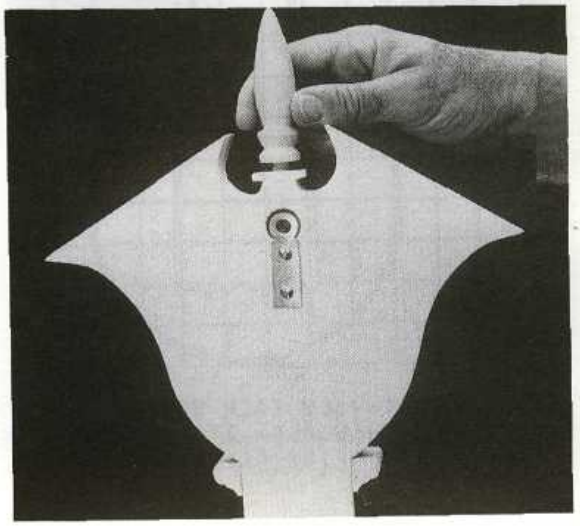

Fig. 2-3. Drill a ⅜-inch hole ¾ inch deep into both finial and case. Attach finial with 1½-inch dowel.

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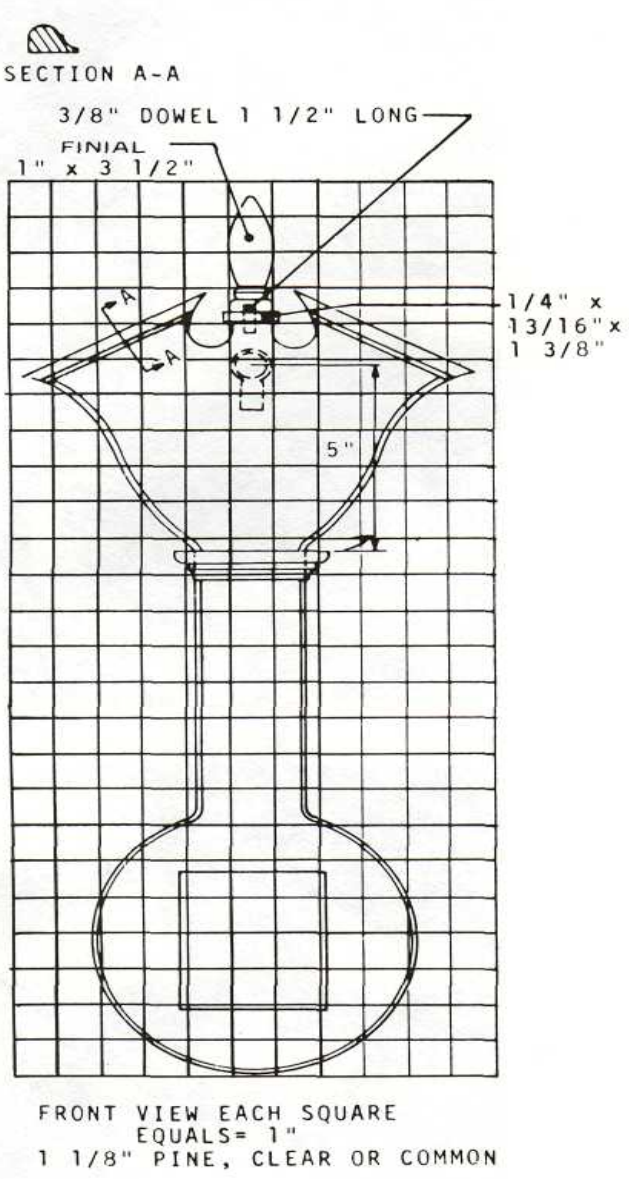

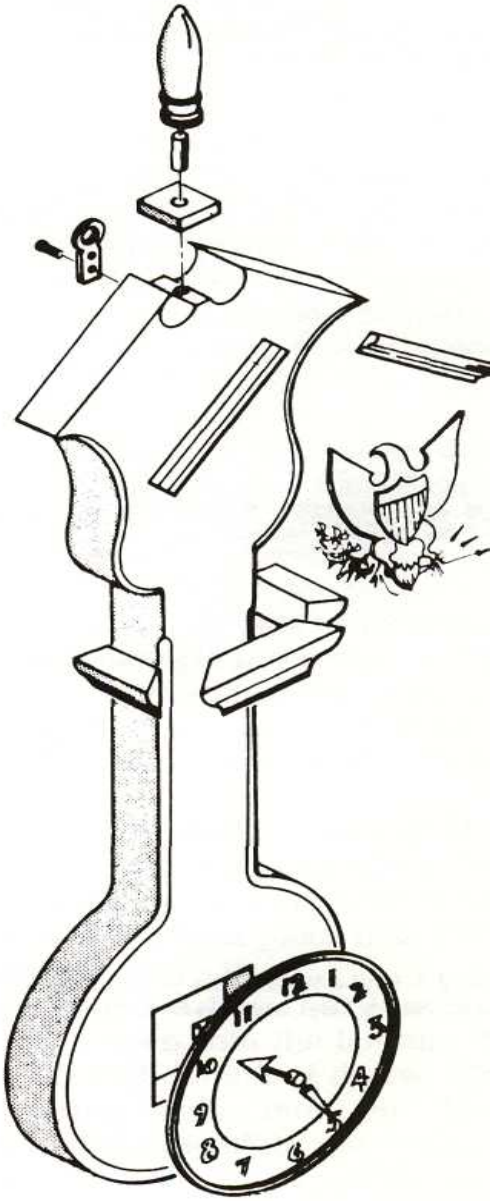

MATERIALS LIST

Purpose	Size	Description	Quantity
Basic unit	1⅛" × 11" × 23"	Pine	1
Finial platform	¼" × 1" × 1½"	Pine	1
Trim	¾" × 2'	Nose and cove molding	1

Note: You will also need, finial, eagle, dial, clock movement, hardware, etc.

paint has a chance to dry, wipe the surface with a cloth. This will create highlights while the depressions remain dark. To mount the eagle, pierce two tiny holes with a brad, then install with escutcheons. The dial is also mounted with escutcheons.

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Bedside Table

WHY MUST A bedside table be boring? They always look alike. Simple and square, often useful, but never interesting.

This table, however, would be an unusual addition to any bedroom. It's made with a handsome curve that's painted a bright color, and includes plenty of tabletop space for phone or bedside lamp. There's also a convenient drawer and even a bin ideally suited for tucking away your telephone directory where it can be found when needed. Drawer and fronts are naturally finished wood, a nice accent to the rest of this colorful table.

It's all made from ¾-inch birch plywood (except for the drawer bottom and slides). See the adjacent Materials List.

To begin construction, cut out the top, bottom, sides, and back as shown. Take the sides, and lay out the cutout. This can be cut with a hole saw for the curves and a table saw for the straight cuts. Or use a saber saw or band saw for everything. Now, assemble the top, bottom, back, and sides with glue and No. 4 finish nails.

The drawer and front are made next, so they fit exactly to the dimensions of the main body of the table. Cut out the drawer pieces as shown in the drawing. Assemble the drawer with No. 4 finish nails through the sides into the front and back of the drawer and glue.

Cut the drawer slides out of a piece of scrap pine and attach them to the inside of the table with glue and No. 17 brads. Use the drawer that you have made to determine the exact position of the slides.

Next, attach the front with glue and No. 4 finish nails through the sides.

To finish the table, start by covering all exposed plywood edges with veneer tape. Set all nails and apply wood putty. Sand unit with No. 80, then with No. 120 sandpaper until smooth enough for finishing.

The drawer and front were finished with a fine natural stain made from 60 percent boiled linseed oil and 40 percent turpentine. The main body of the table was finished with four coats of high gloss latex enamel. Each coat was brushed on and sanded with No. 220 paper between coats.

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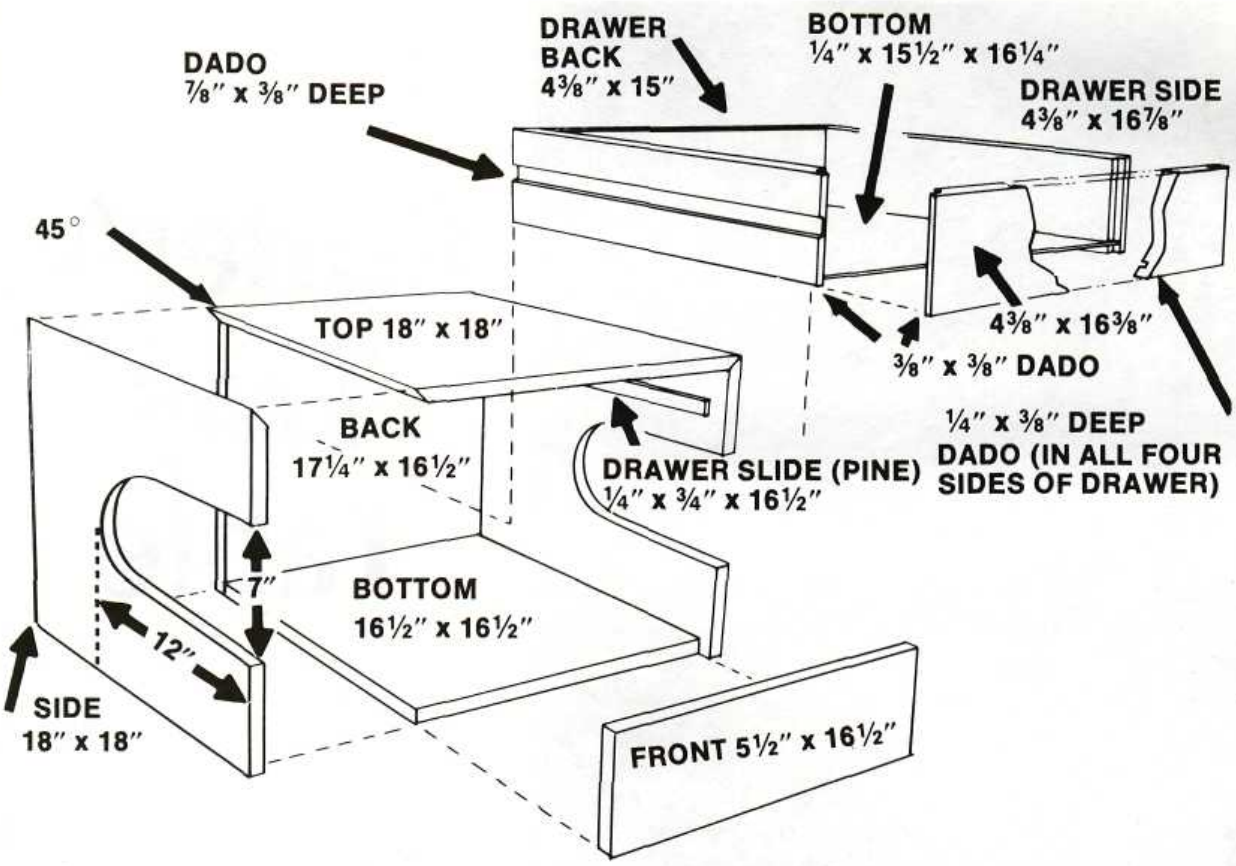

MATERIALS LIST

Size	Description	Quantity
¾" × 18" × 18"	Birch plywood	3
¾" × 17¼" × 16½"	Birch plywood	1
¾" × 16½" × 16½"	Birch plywood	1
¾" × 5½" × 16½"	Birch plywood	1
¾" × 4⅜" × 16⅜"	Birch plywood	1
¾" × 4⅜" × 15"	Birch plywood	1
¾" × 4⅜" × 16⅞"	Birch plywood	2
¼" × 15½" × 16¼"	Masonite	1
¼" × ¾" × 16½"	Pine board	2
1½"	No. 4 finish nails	
¾"	No. 17 finish nails	
	Veneer tape	
	Contact cement	15′
	White glue	

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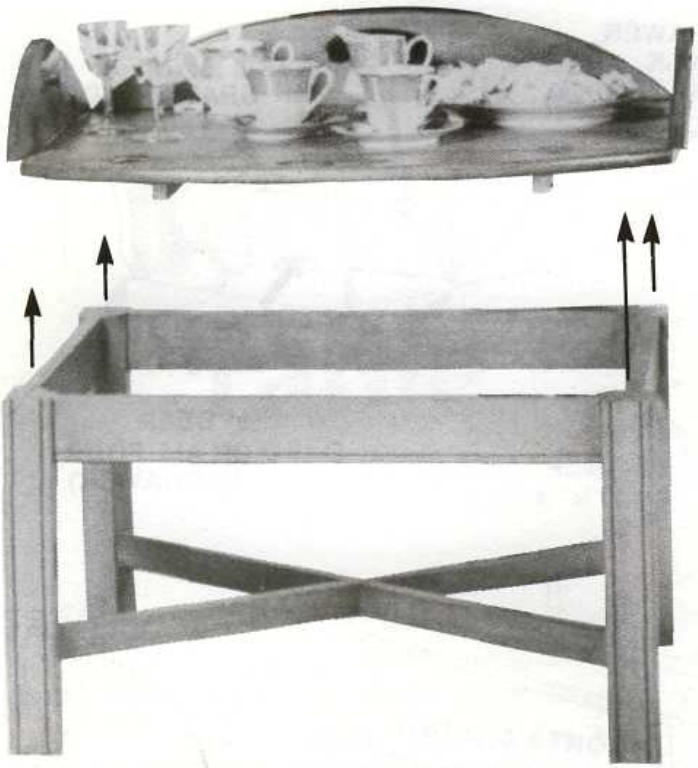

Butler's Tray Table

HERE'S A NEAT woodworking project that you'll be proud of—a butler's tray table. As the name implies, it serves two purposes—a sturdy table and a handsome serving tray. Special butler tray hinges have no projections and are spring loaded so they will hold in any position. A clever self-centering arrangement on the underside of the tray holds it in place on the base so it cannot accidentally slide off. The unit shown was made of lumber-core birch, but other woods may be substituted. For a colonial look, pine may be used.

Start with the base. Cut the squares for the legs to size, then clip the diagonal on the table saw. Be sure to place the fence so the waste will fall away from the blade, otherwise a kickback may result.

The legs are now ready to be grooved. This can be done either on the shaper, if you have one, or with the router. If the router is used, it would be best to mount it inverted on a table, as shown. This converts it to a mini-shaper and mak much easier to use. Insert a V cutter in router collet and set the proper dept cut. The cut should be ⅛ inch deep makeshift fence consisting of a small p of wood and a couple of clamps will Set the fence so the cut is ⅜ inch in f the edge of the work. Run the v through, then change cutters and roun the three corners shown. If your cutter a pilot, you will not require the fenc

Rails for the table are cut to size drilled to take two ⅜-inch dowels. Dc transfer points are used to locate the hc Prop up the work as shown for pr alignment. Center punch the prick m left by the points, then proceed to dril holes for the dowels. The depth of the h should be 1 1/16 inch. Insert dowels glue and assemble the base.

The top board is prepared next. If table saw fence will not extend far eno try this: clamp a strip of wood to

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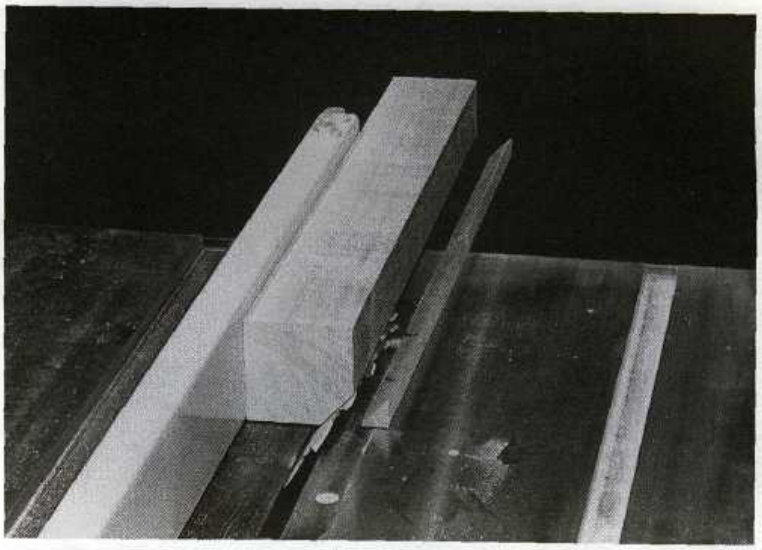

Fig. 4-1. When ripping the diagonal for the legs, it is best to set the fence on the proper side to give you the maximum safety.

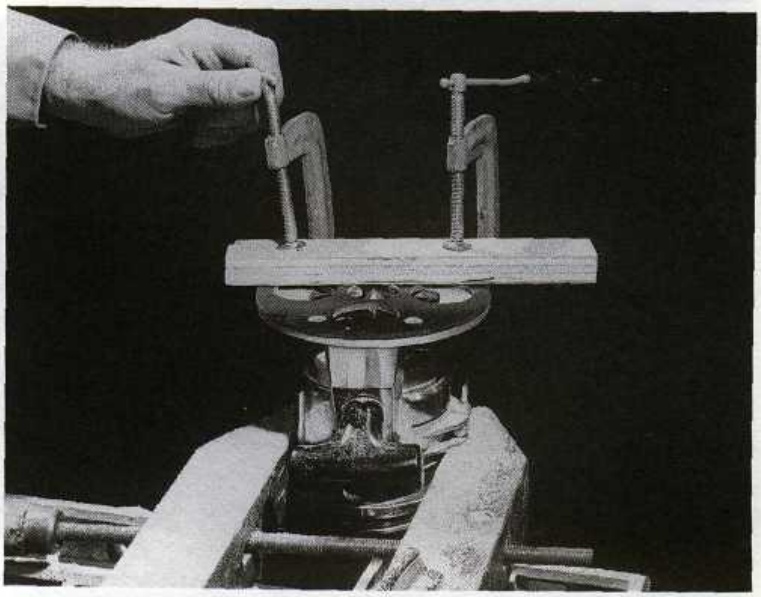

Fig. 4-2. The router is being used to groove the legs. The inverted position shown makes it easier working small pieces.

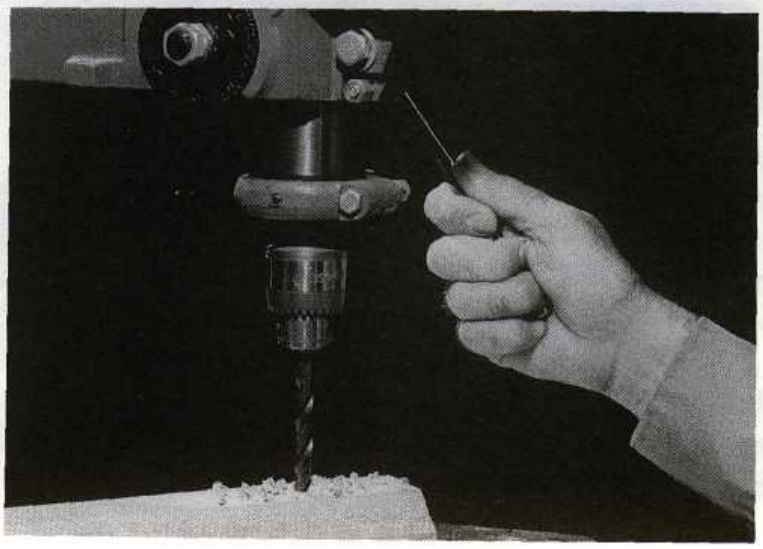

Fig. 4-3. Accuracy makes the drill press ideal for holes. If you use a portable drill, be sure it's straight and square.

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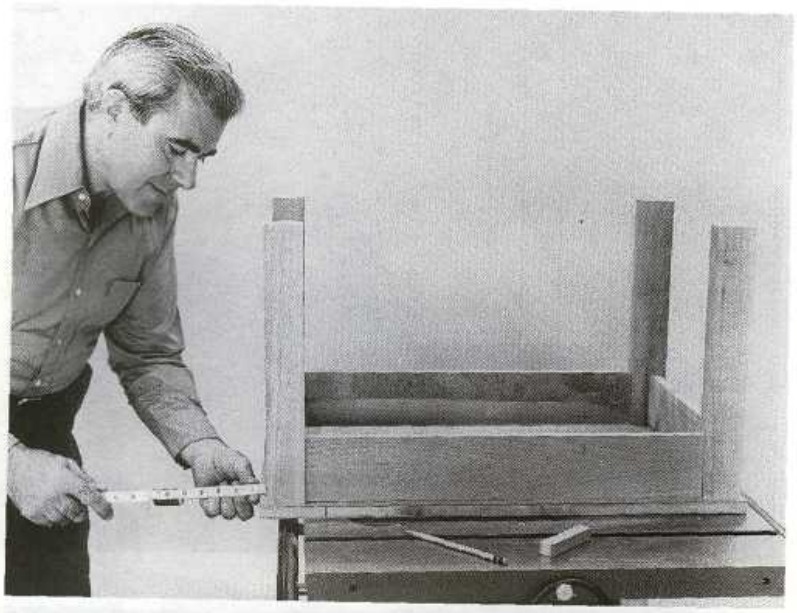

Fig. 4-4. Place base on top, center carefully. Mark off the inside edges of the rail, then slowly cut along the guides.

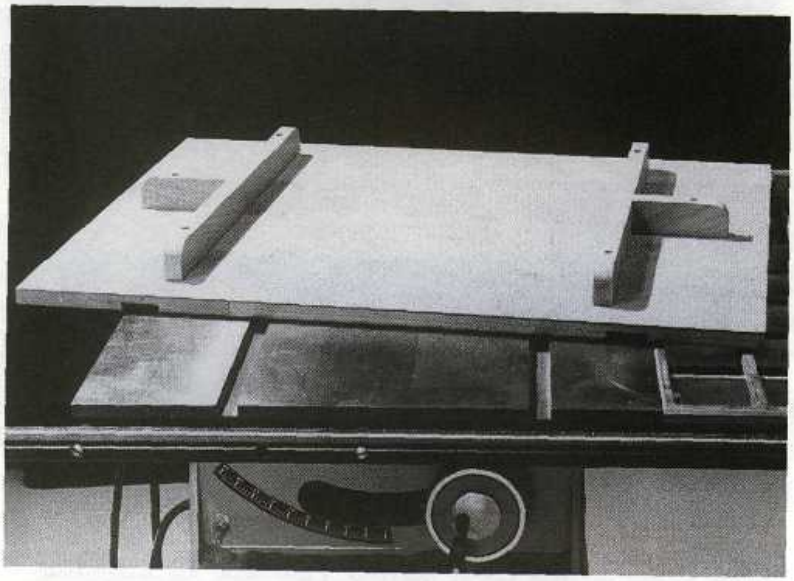

Fig. 4-5. The aligning jig on the underside of the top is made with rounded corners to make the tray "fall" into its place.

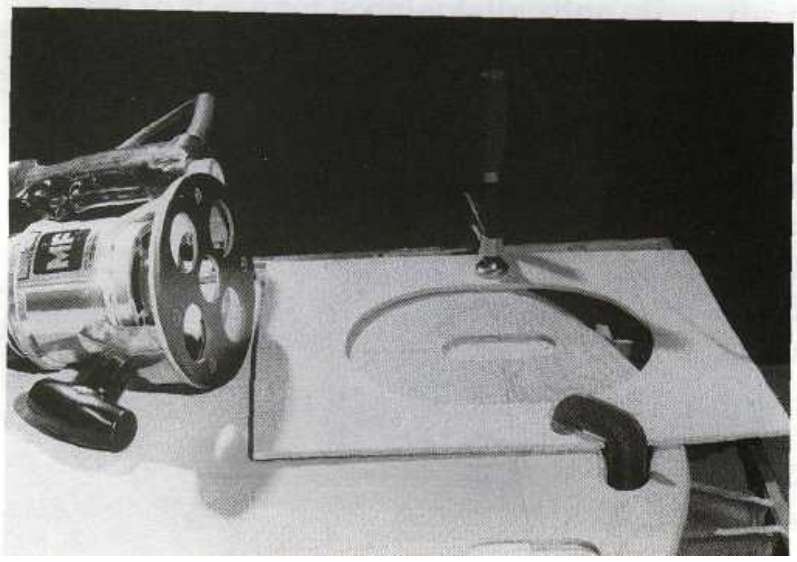

Fig. 4-6. Shown here is the easy way to mortise hinges. The plywood jig will give perfect results every time. Note center lines.

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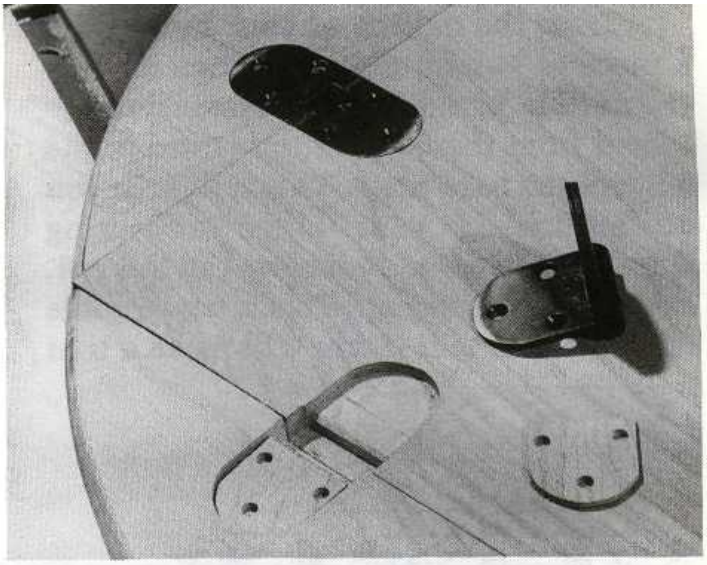

Fig. 4-7. One hinge is already mounted and the other is ready to be. Remember other types of wood, as pine, may be used.

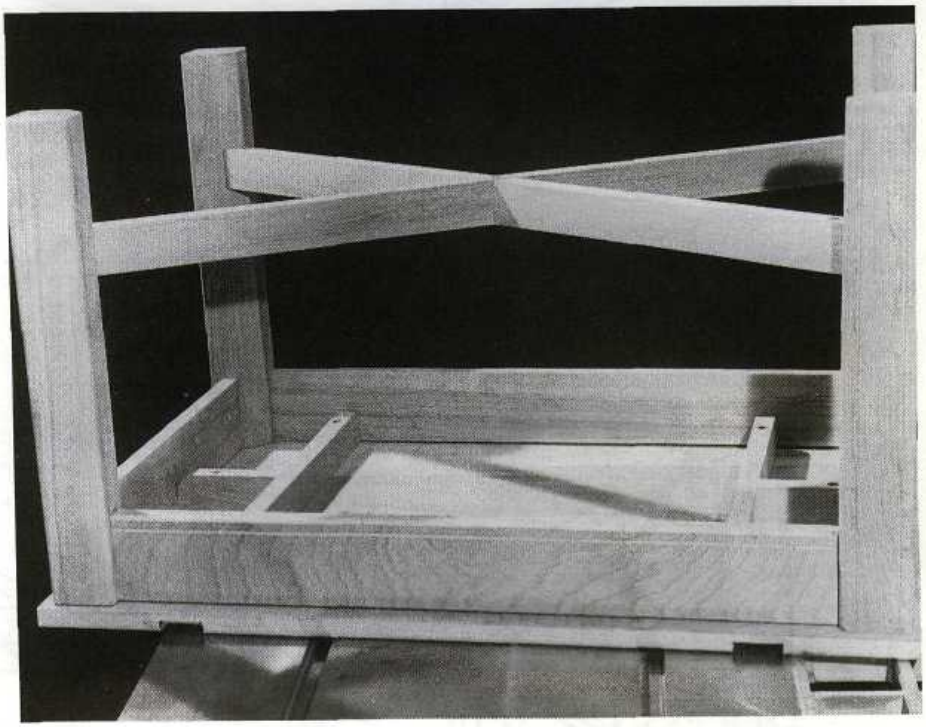

Fig. 4-8. One advantage of lumber-core plywood is that edges can be sanded easily. Here the table base is ready for finishing.

underside of the work, then use the edge of the table as a guide. Place the assembled base on the tabletop and carefully center it. Next mark off the jig which consists of four cleats, two long and two short. They are cut so they will be a trifle smaller than the inner dimension of the rails. Align and then install.

The curved sides are made next. These can be cut either on the band saw or with a saber saw. After cutting, sand the edges smooth then shape the edge still using the router as a shaper.

Next, mortise the hinges. Some butler hinges have half-round ends while others are square. Regardless of the hinge used, a mortising jig made of ¼-inch plywood can be used advantageously. Simply note the distance from the outside of the cutter to the outside of the router base plate.

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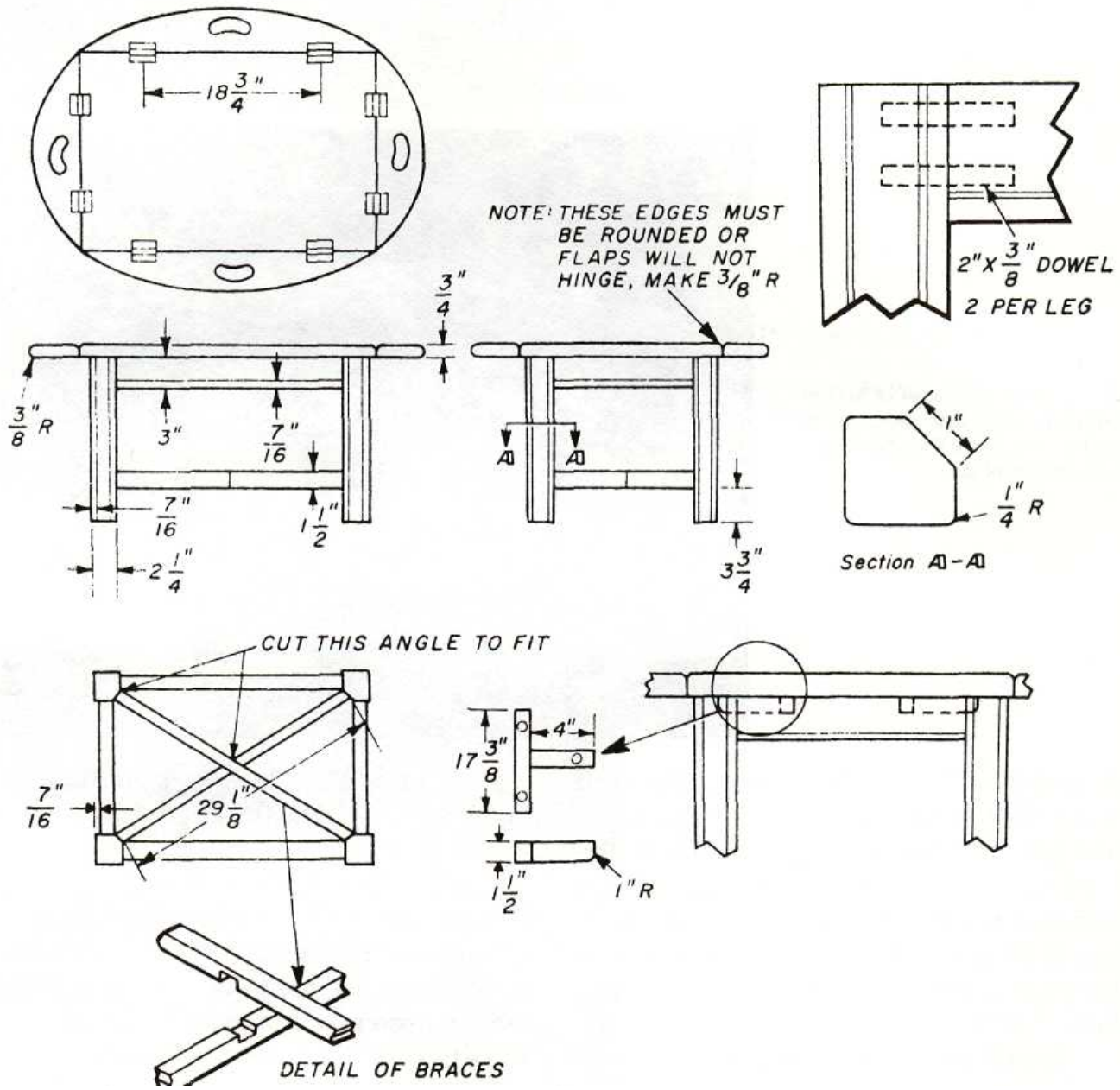
Trace the outline of your hinge onto a piece of ¼-inch plywood, then enlarge the outline by adding the dimension obtained from the edge of the cutter to the edge of the base plate. This will give you an outline of your hinge measuring something like 8 × 14 inches. Cut this out, saving the outside part. This is now a guide for the router and if you will make a trial cut on scrap wood, you should find that the hinge will fit perfectly into the mortise.

The butler hinge is unique in that the leaves are not the same thickness. This means that the mortise will have to be made to the deepest part of the hinge. Shims are made to be placed under the thinner part, as shown. Some butler hinges have the same thickness leaves, so it is



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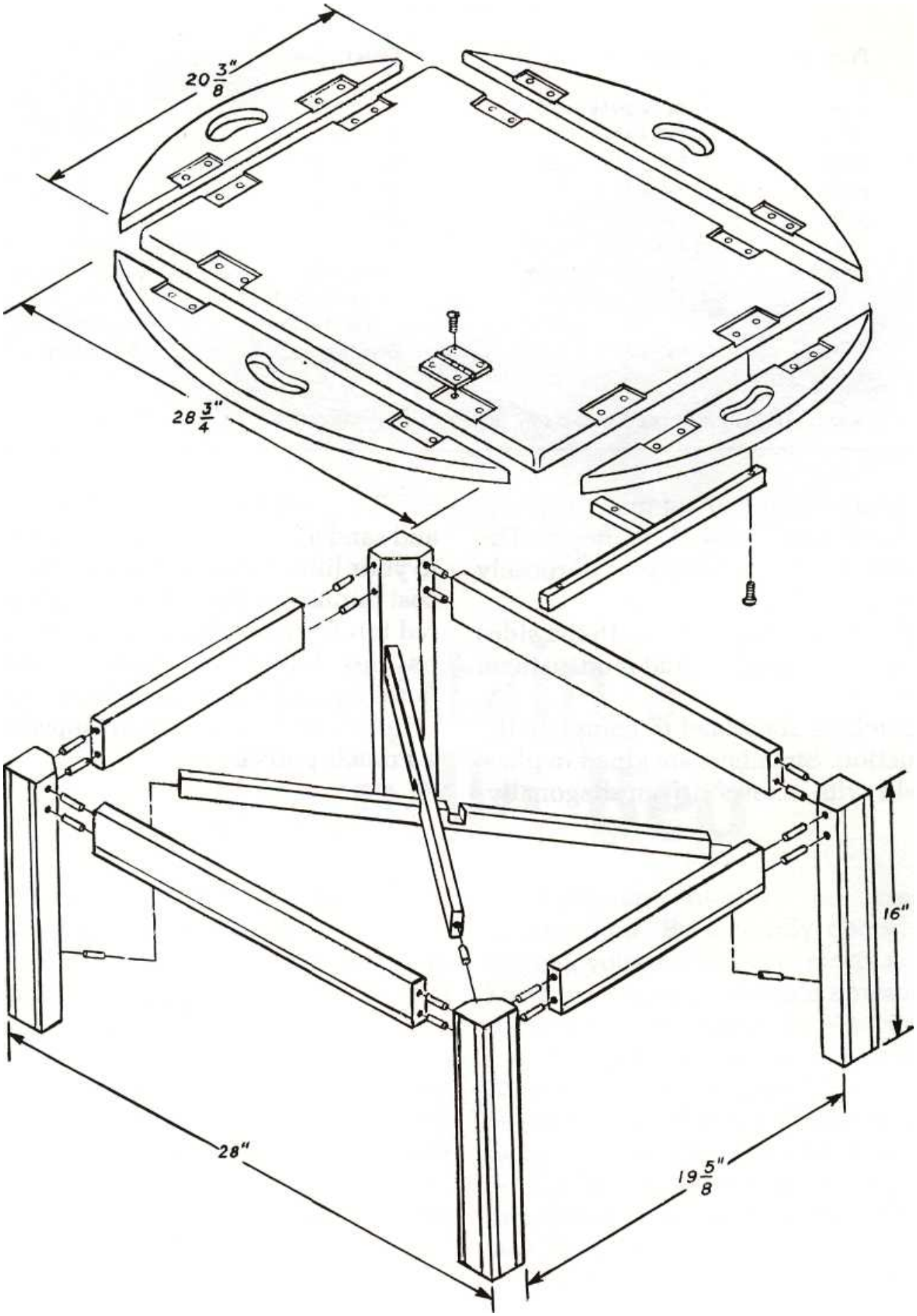

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MATERIALS LIST

Purpose	Size	Description	Quantity
Top	¾" × 20⅜" × 28⅞"	Red birch	1
Flaps	¾" × 4¾" × 28¾"	Red birch	2
Flaps	¾" × 4¾" × 20⅜"	Red birch	2
Rails	¾" × 3" × 23½"	Red birch	2
Rails	¾" × 3" × 17⅛"	Red birch	2
Legs	2¼" × 2¼" × 16"	Red birch	4
Stretcher	¾" × 1½" × 29⅛"	Red birch	2
	1½"	No. 8 Round-head screws	as needed
	⅜" × 2"	Dowels	as needed

Note: You will also need butler tray hinges and finishing materials.

recommended that you not mortise for the hinge until you have it in hand. The dimension for the mortise was purposely left out of the drawing.

When mortising, place both the sides and table top in position and mortise them together.

Stretchers are added to complete the construction. Stretchers are glued in place and held with screws driven diagonally.

To finish the table, remove the hinges and sand all parts thoroughly. Then finish to your liking. Antique red (with the base coat thinned so the rich grain pattern of the red birch would show through) was used on this tray table. Many finishes are possible, and if antiquing is not your cup of tea, try a wood-tone stain topped off with a French polish.

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Captain's Trundle Bed

THIS CAPTAIN'S TRUNDLE BED has a lower drawer that rolls out to be used as an extra bed or as a bin for clothes, bedding, toys, or whatever. It is designed so that both upper and lower sections take a 39- × -75-inch mattress (standard twin size). The drawer is mounted on casters and rolls out easily from either side. Prefinished paneling, in the head- and footboards as well as the roll-out bin, simplifies construction and adds to the appearance of this fine furniture. Finish of the solid lumber can be made to match or contrast with the paneling.

Common lumber is used for construction. By carefully choosing and cutting, you can eliminate most knots. The knots are not objectionable however, and some folks prefer them, so take your pick.

Rip the legs from a length of ¾ (2-inch) - × - 12-inch pine. The actual size of the board is 1 13/16 × 11¼ inches. Cut four pieces, each 2 1/16 inches wide. After cutting, use a plane or jointer if you have one and smooth the rough edges left by the saw blade.

Next rip the two side pieces from ¾- × -10-inch stock (actual size 1 3/16 × 9¼

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inches), and trim the ends to make them 7⅜ inches long. Cut the cross members from the same material. Make two pieces each 6 × 39 inches and from the remaining strip, make two pieces each 3 × 39 inches.

Make a pattern for the scroll at the top of the crosspieces. Draw the necessary squares and plot the shape onto the pattern, using wrapping paper or thin cardboard. Cut the curved portion of the pattern, then trace onto the crosspieces. Cut the shape with a saber saw fitted with a 10-tooth contour blade—this should leave a fairly smooth cut.

The side rails are made next. The offset step can be cut in several ways. You can rip most of the long section, then use a saber saw to finish at the offset. You can also use a band saw, or (although slower), you can cut the entire length with a saber saw. In either case, you will have to smooth out the edge. The best way to do this is to use

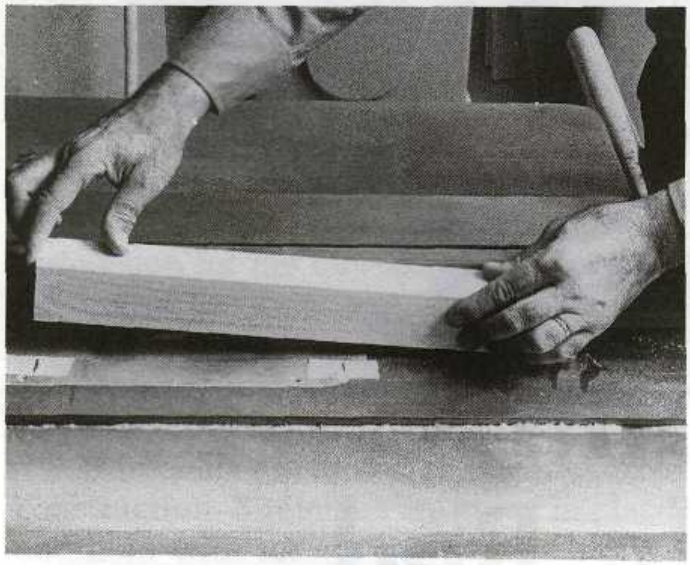

Fig. 5-1. Cut the slots for the paneling on a table saw. Notice the tape marks which indicate the start and stop points of blind slots.

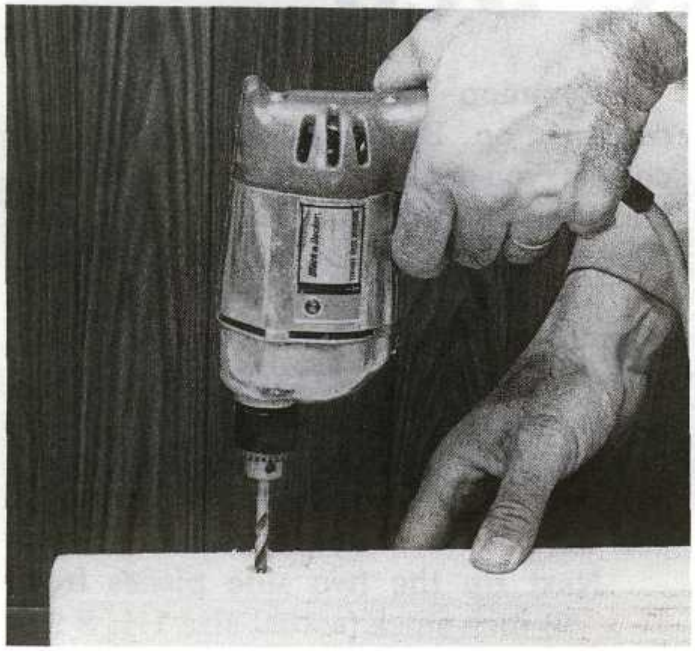

Fig. 5-2. The pilot holes for the screws in the bed posts are drilled as pictured above. The countersunk holes should be drilled first.

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the router and template. The template is made only for the offset. A straight edge is then used for the long, straight part. The router is fitted with a flush cutter at least 1¼ inches long. Make the template from a piece of ⅛-inch hardboard. See detailed drawing.

Tack the template in place so that the cutter just bites into the rough saw-cut edge of the board. Nail the template to the inner surface of the side so the holes won't show.

Of course you can finish the edge by using a plane on the straight part and sandpapering the offset. Round the two

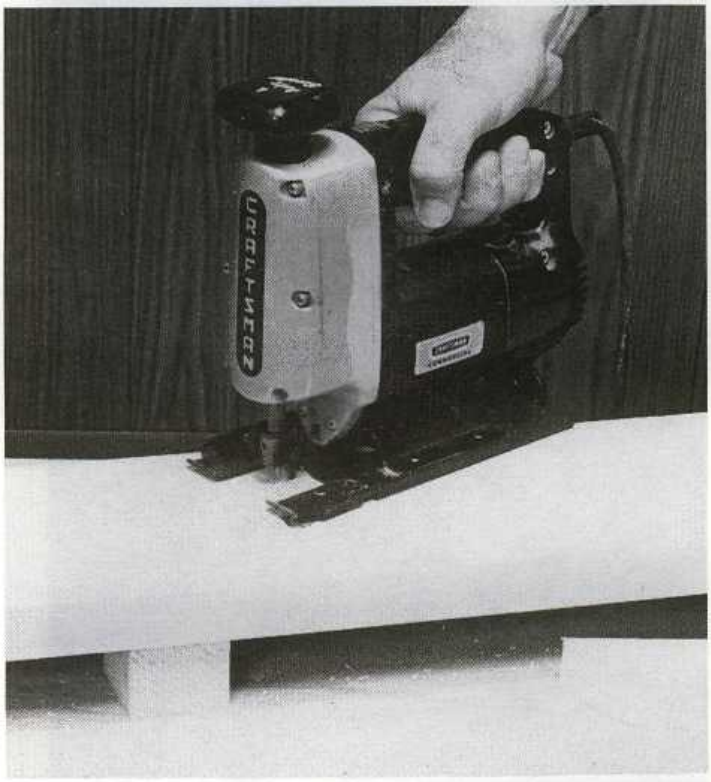

Fig. 5-3. Use a saber saw to cut the shaped edges of both the head and the foot boards. For the best results, use a smooth cutting blade.

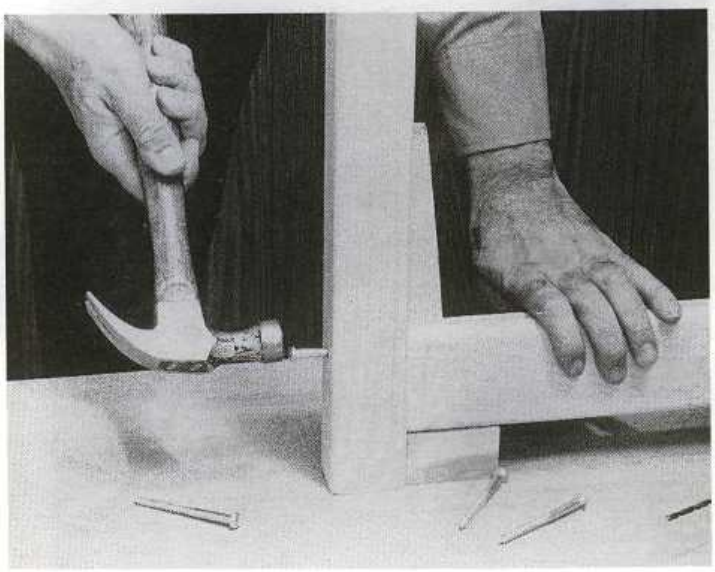

Fig. 5-4. Place a piece of scrap paneling in corners to align posts and cross members. Put scrap wood under crosspiece to position it.

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upper edges and outer edge of the lower part of the sides. The cross members are rounded on all four edges.

Cut a groove for the end panels in each of the crosspieces. Note that the groove is centered. Use either a dado blade or make several passes with a regular blade on your table saw. The upper pieces are cut on the lower edge. The top edge is cut in the lower pieces.

Before making the cut in the workpiece, check the width of the cut on a scrap piece. The panel should fit snugly. Make the groove 11/32 inch deep.

Reset the fence for the posts, placing the grooves in the center. Note that blind grooves are made. Place masking tape on the saw table and draw starting and stopping lines as shown. Make test cuts on scrap lumber first. Hold the work slightly above the revolving blade with the end of the piece aligned with the pencil mark. Carefully lower the work into the blade and advance until the rear end of the post reaches the mark on the second piece of tape. Grooves (dadoes) should start and stop 3 inches before ends of posts. See detail.

Locate the screw holes in each of the posts. Note that the spacing is different at the tops and bottoms. Drill the ½-inch counterbore hole first. Make it ⅜ inch deep,

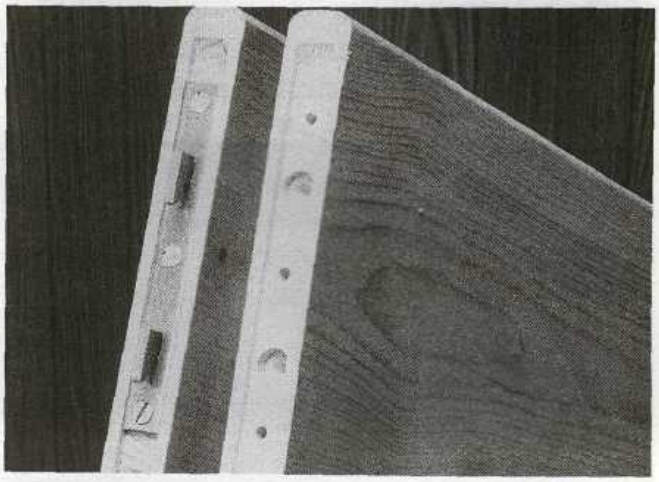

Fig. 5-8. Here we see the side piece ends, one with hooks, the other without. The larger holes are drilled clearance for rear projections.

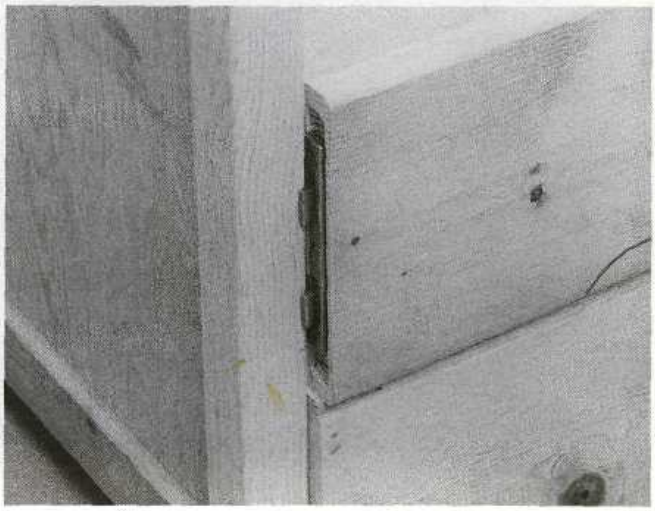

Fig. 5-9. To locate the mating parts of the hook hardware, match posts to side which are on trundle with ½-inch spacer in between.

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then follow with the screw clearance hole.

After the holes have been drilled, round off the edges of the posts and form the slight curve at the top. Do this on a lathe if possible, otherwise use a block of wood wrapped with rough sandpaper and do it by hand. Drill a dowel hole at the top to receive the dowel for the acorn ornament. The ornaments are available at home improvement centers and lumber yards. Some of these have a rather large threaded dowel. To simplify matters, insert the threaded dowel, cut it off at the base, then redrill a ⅜-inch hole to take a regular dowel.

Round off the edges of the posts with a small rounding cutter in your router. A ¼-inch radius cutter is recommended.

Before assembling the parts, sand all pieces carefully. Install a scrap piece of ¼-inch paneling into the corners to align the posts and cross members. Place a piece of 1½-inch wood under the crosspiece to position it on the post. Then mark and drill pilot holes for the screws into the ends of the cross members. Assemble the parts with glue.

The ends of the side pieces are dadoes to receive the bed hooks. Use a side cutter about ⅜ or ½ inch deep. Nail a guide strip on the inner surface of the rail. Place it so the depth of cut will match the thickness of the hardware.

For the hooks shown, the depth is ⅛ inch. Make the cut just a trifle deeper. At the rear end of the side rail, the dado is blind. At the front, only the top need be blind. The bottom can run off the edge. See detailed drawing. You will have to file the back of the hook to match the curve of the

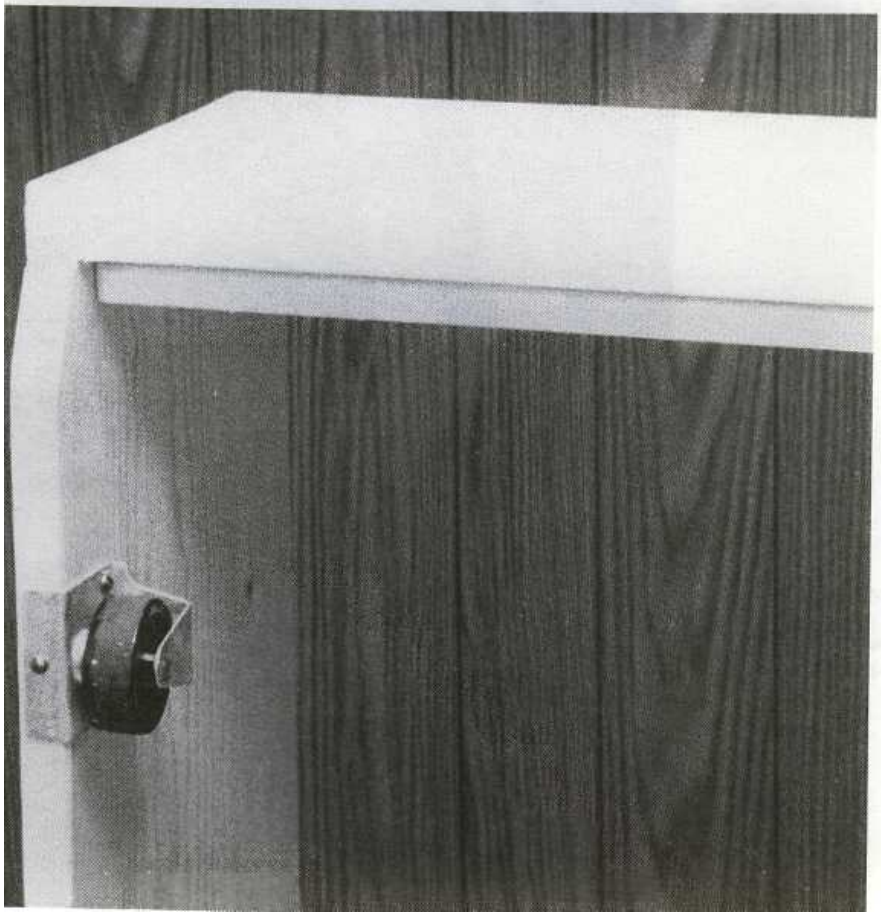

Fig. 5-10. The casters shown here are a special type made for the trundle beds. They can be installed quite easily with just three screws.

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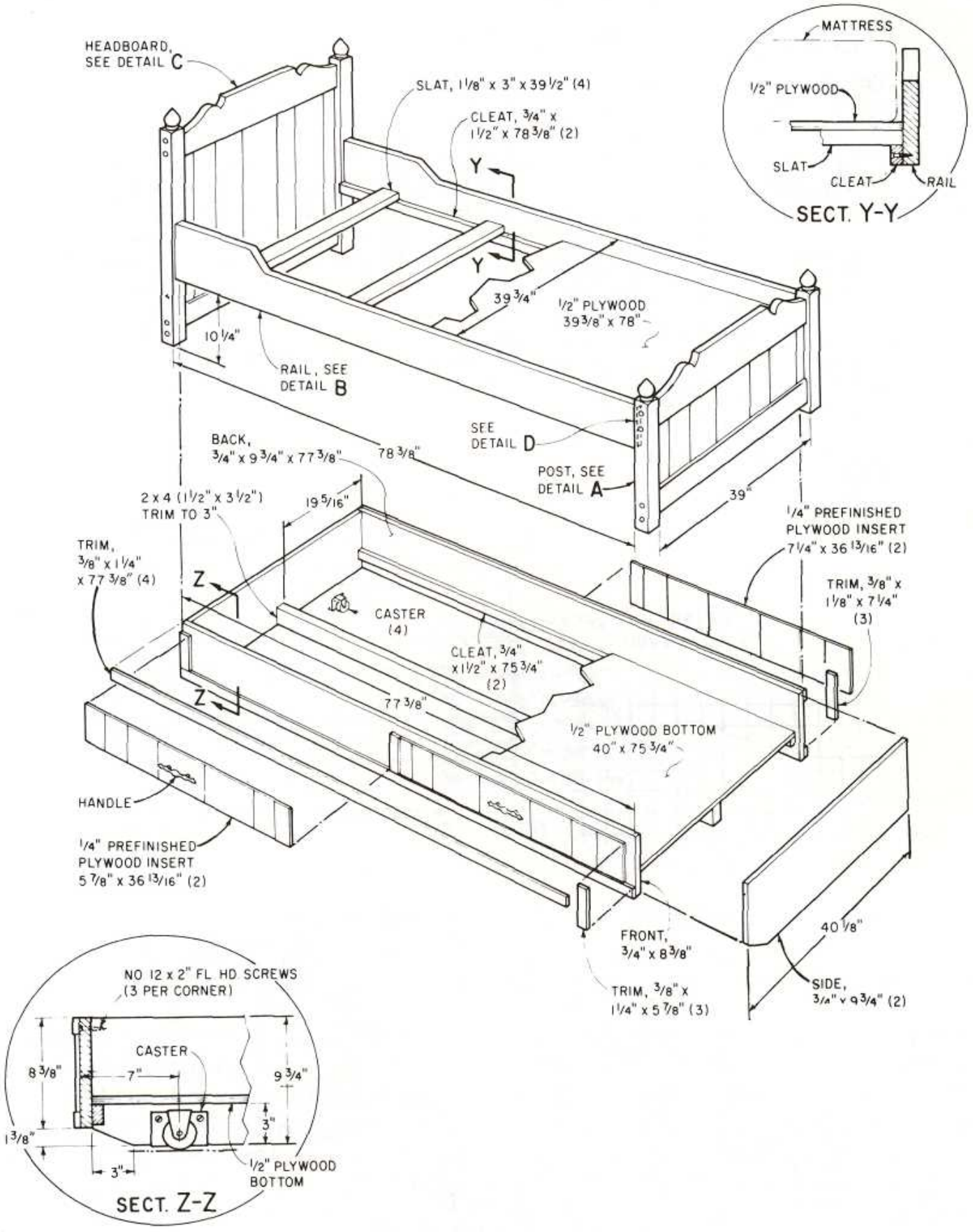

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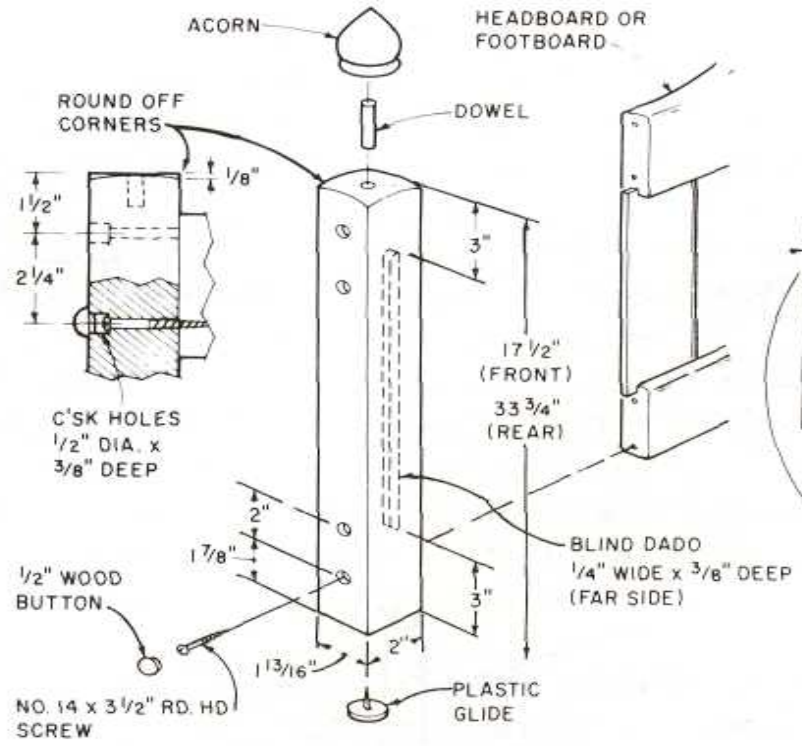
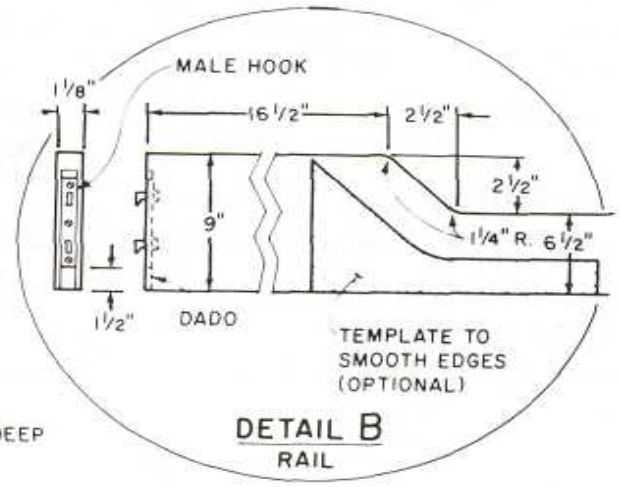
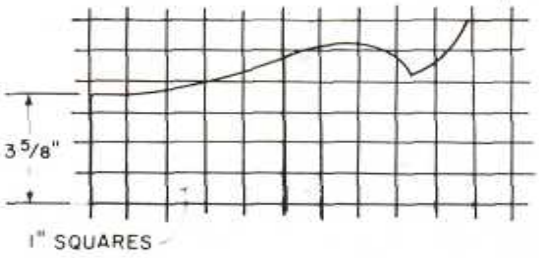
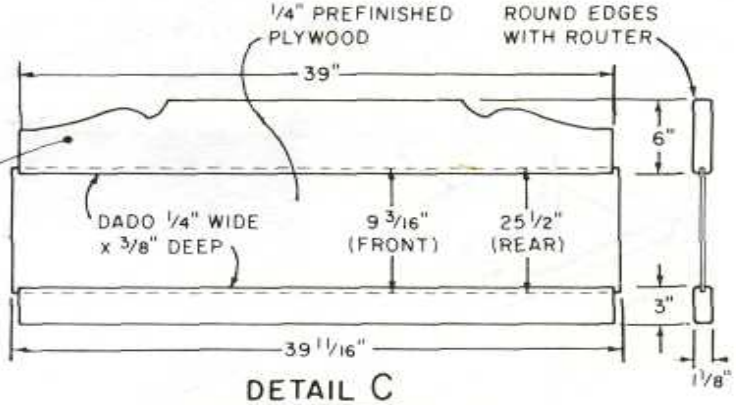




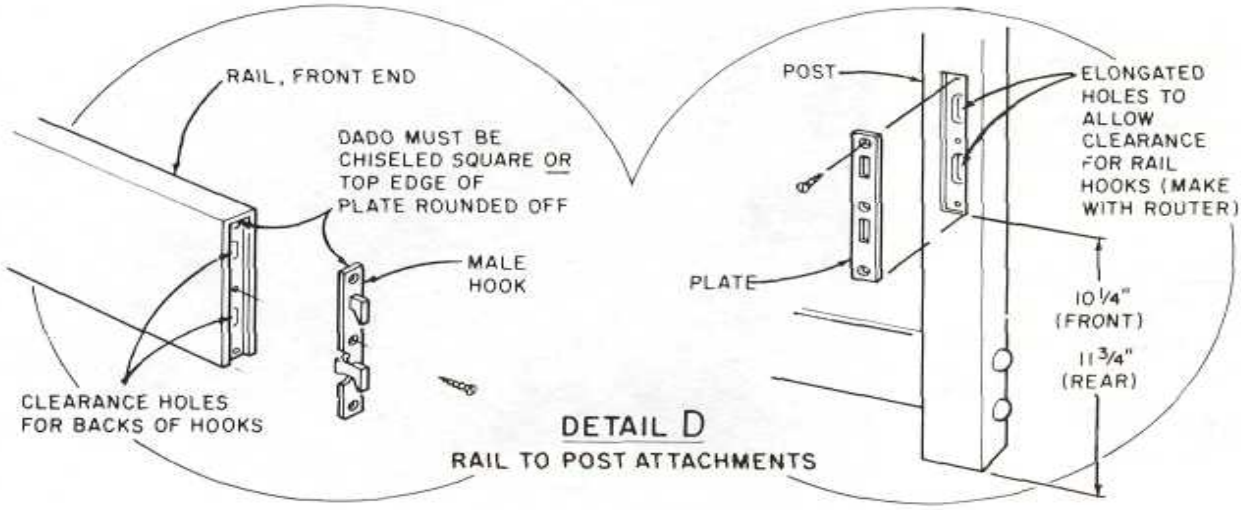
DETAIL B
RAIL

DETAIL A
POST ASSEMBLY





DETAIL C
HEADBOARD AND FOOTBOARD



DETAIL D
RAIL TO POST ATTACHMENTS

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MATERIALS LIST

Purpose	Size	Quantity
Bed		
Post, rear	1 13/16" × 2" × 33 3/4"	2
Post, front	1 13/16" × 2" × 17 1/2"	2
Header rail	1 3/16" × 6" × 39"	2
Bottom rail	1 3/16" × 6" × 39"	2
Side	1 3/16" × 9" × 78 3/8"	2
Front panel	1/4" × 9 3/16" × 39 11/16"	1
Rear panel	1/4" × 25 1/2" × 39 11/16"	2
Cleats	3/4" × 1 1/2" × 78 3/8"	1
Slats	1 13/16" × 3" × 39 5/8"	6
Bed hooks	3/4" × 8" FH screws	4 sets
Acorns		4
Buttons (to conceal screws)		16
Plywood	1/2" × 39 3/8" × 78"	1
Glides		4
Screws	3 1/2"-14 RH	16
Trundle		
Front and rear	3/4" × 8 3/8" × 77 3/8"	2
Sides	3/4" × 9 3/4" × 40 1/8"	2
Plywood	1/2" × 40" × 75 3/4"	1
Cleat	3/4" × 1 1/2" × 75 3/4"	2
Center support	1 1/2" × 3" × 75 3/4"	1
Trim	3/8" × 1 1/4" × 34'	
Panel insert	1/4" × 5 7/8" × 36 13/16"	4
Casters		4
Screws	2"—12 FH	12

Note: If you cannot locate the bed hooks or casters locally, write to J.C. Armor, P.O. Box 290, Deer Park, N.Y. 11729.

blind dado, or you can chisel out the corner so the hardware will fit.

You will also have to make two passes with the router to obtain the correct width for the hook. Drill out clearances for the protrusions at the rear of the male hooks, then attach with FH screws.

Note that the female plate is not symmetrical. The slots are closer to one end than the other. Orient them properly, then mate with the male. Stand the bed up with props and with trundle in place, lay a ½-inch spacer on the trundle, then rest the rail on it. Carefully mark the posts, indicating the location of the plate vertically.

Now place the post assembly on the work table and draw the exact position for the plate. Route with an end cutter, then

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clean out the corners with a chisel. Also, chisel out the clearance for the male sections. Install the plate with FH screws.

To make the trundle, rip four pieces of pine. Make two of them 8⅜ inches wide × 77⅜ inches long and two pieces 9¾ × 40⅛ inches. Bevel one corner of each of the 40⅛-inch pieces as shown. Assemble these with nails and glue, using two nails in each side. After the piece has been assembled and squared, add a few screws as shown.

Add two long cleats with their top edge 6⅜ inches from the top of the frame. Apply glue and nail from the inside, usin 1½-inch nails, slanting them slightly. Ad a piece of 1½- × -3-inch stock to the cen ter. Be sure its top edge is level with th two cleats.

Add trim to the front and rear a shown, then cut the inserts to size an install with glue. Drill holes for the pull centering the pulls in each panel.

Finish the piece as you desire. Plac masking tape on the paneling to simplif the finishing. Then remove carefully.

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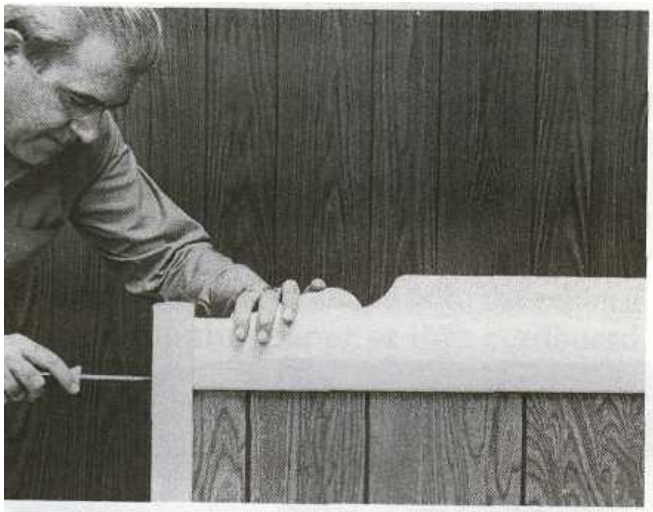

Fig. 5-5. Assemble the head and foot board sections with glue and screws. Countersunk screw heads will be concealed by wood buttons.

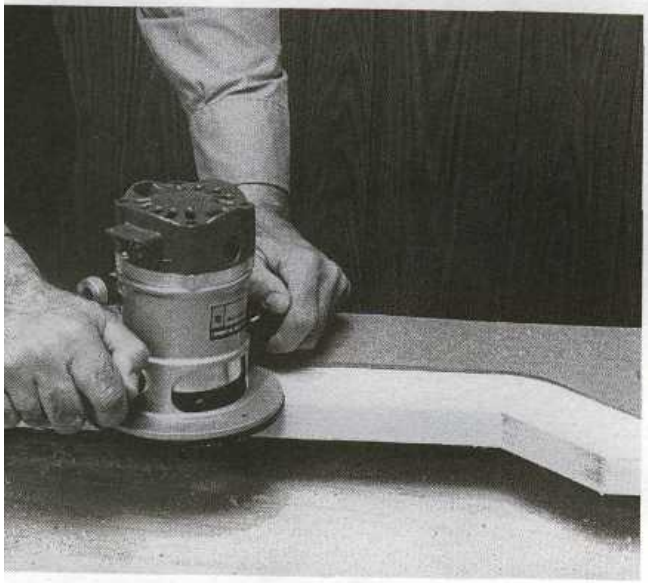

Fig. 5-6. Having cut side pieces with a saber saw, you can clean edges using a router and template, or else plane and sandpaper.

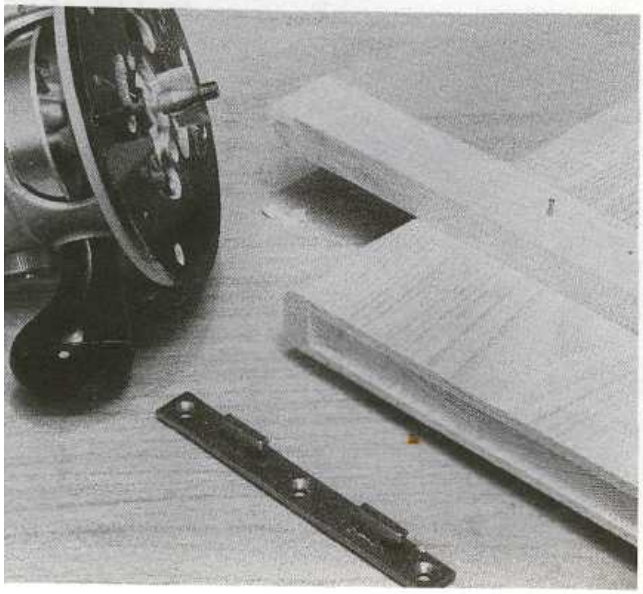

Fig. 5-7. The ends of the side pieces are dadoes to receive the bed hooks. Use a side cutter about ⅜ or ½ inch deep and use a guide.

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Charming Pine Rocking Horse

THE ROCKING HORSE has long been a favorite toy in America. Colonial children played on crude log horses made by their fathers using the most basic of tools. As the rocking horse grew in popularity, skilled carpenters started to make them to order. They were well made and many were passed on from generation to generation as family heirlooms and collectors' items. The rocking horse made from our plan is also sturdily built and designed to last a long time. Hopefully, it too will become a family heirloom while giving your youngsters many hours of joy.

Be sure to read all instructions carefully before starting actual construction.

The horse is constructed of pine and stands 37½ inches tall. The runners are 58½ inches long. The body and runners are cut from 5/4-inch stock (1⅛inch actual size). The supports are 4/4-inch stock (¾ inch actual size). The ''saddle'' is padded with foam for greater seating comfort.

The head and body are joined at the neck for two reasons. One is that the lumber is not readily available in widths over 12 inches and secondly, that the grain

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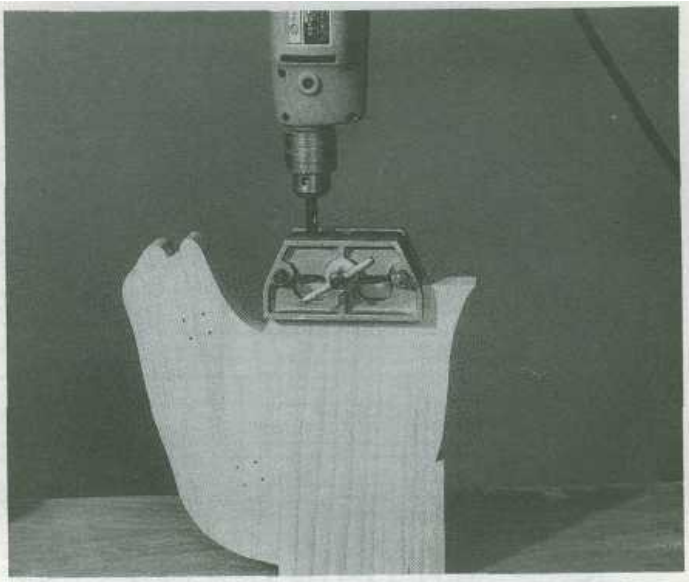

Fig. 6-4. Drilling the dowel holes in the neck. Jig assures accuracy. If done by hand, make hole straight. Insert dowels, then glue.

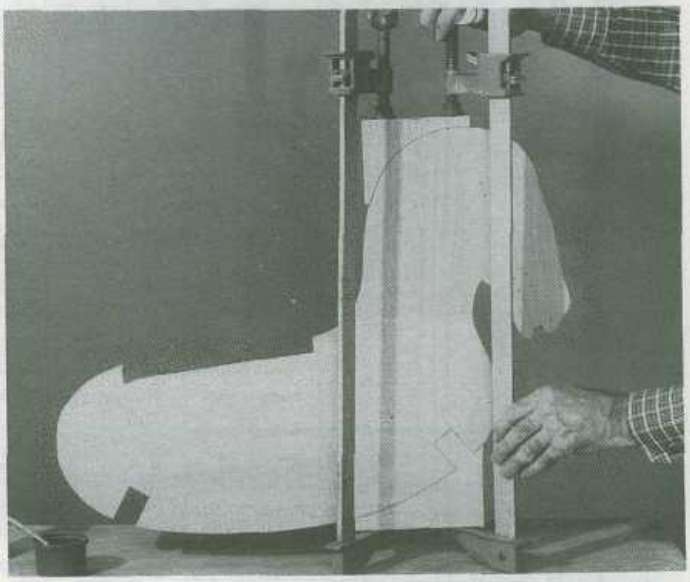

Fig. 6-5. Clamps are applied to join the head and body. The lugs will be sawed away later. Spacer block is then inserted.

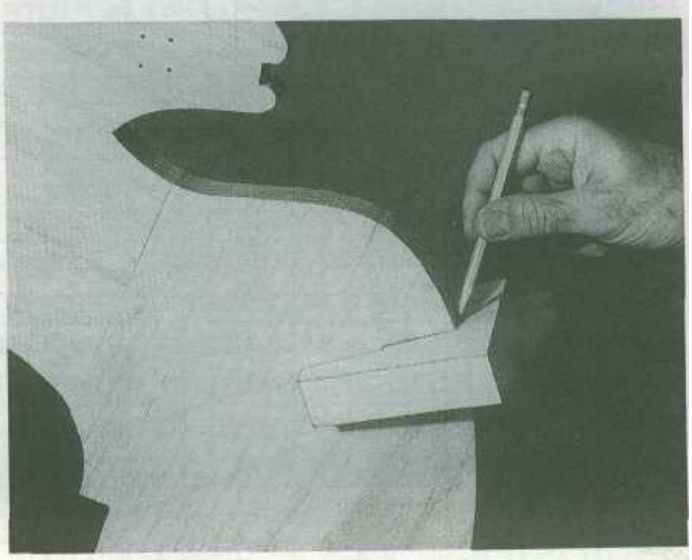

Fig. 6-6. Spacer block inserted and marked so it can be beveled to match body contour. Jig holds it at angle for screw holes.

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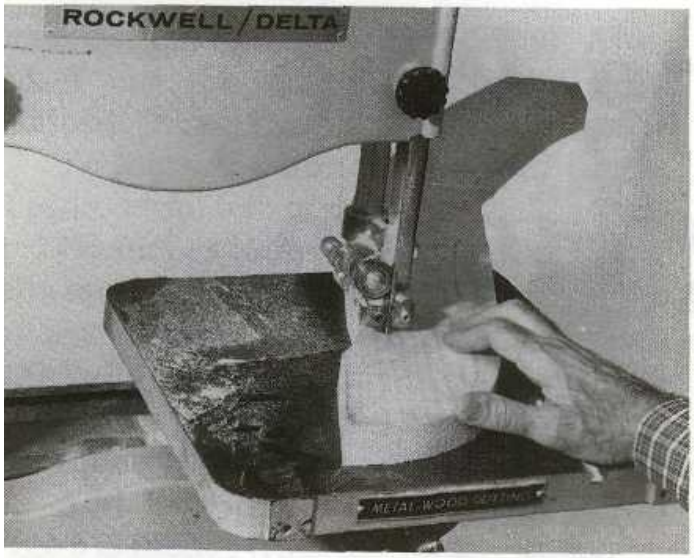

Fig. 6-1. Rocker member is being cut on the band saw. A saber or jigsaw can be used. Rocker is held in a jig for cutting ends.

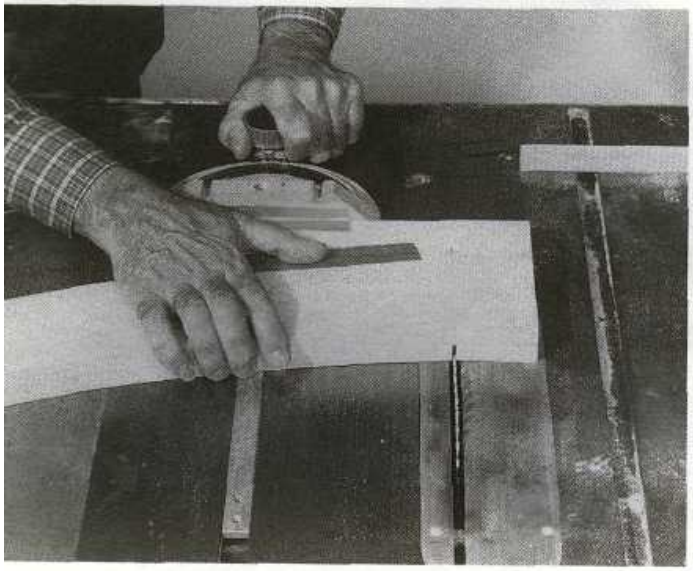

Fig. 6-2. After the end is trimmed, the jig is moved 2½ inches and the first cut of the half-lap is made with lowered saw blade.

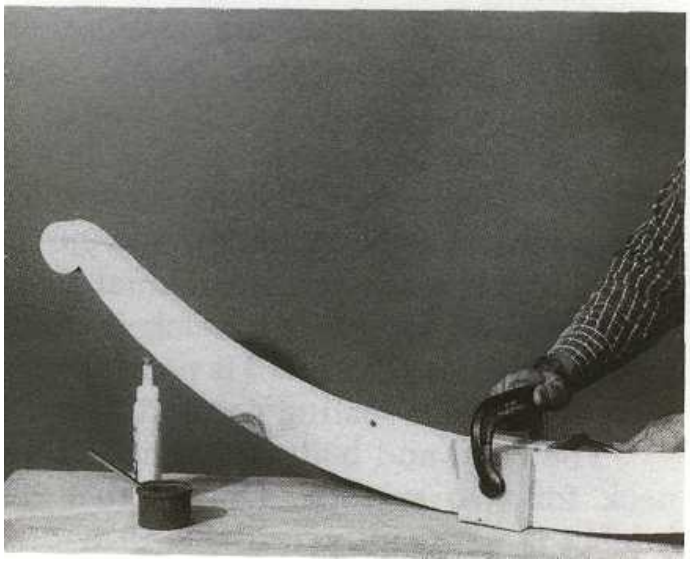

Fig. 6-3. Runner sections are joined at the half-lap to make full runner. Apply glue and clamp securely. Scrap wood protects.

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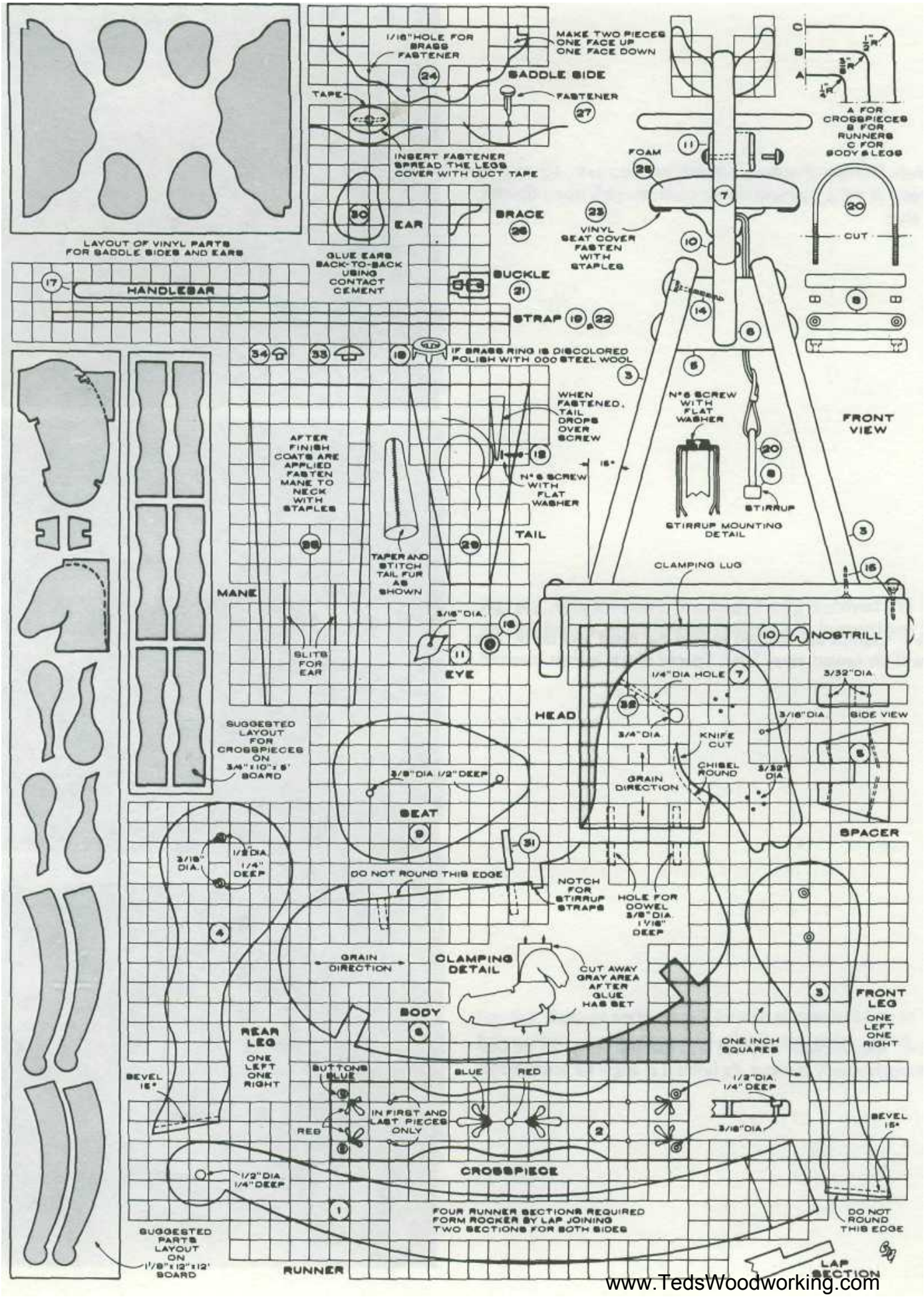

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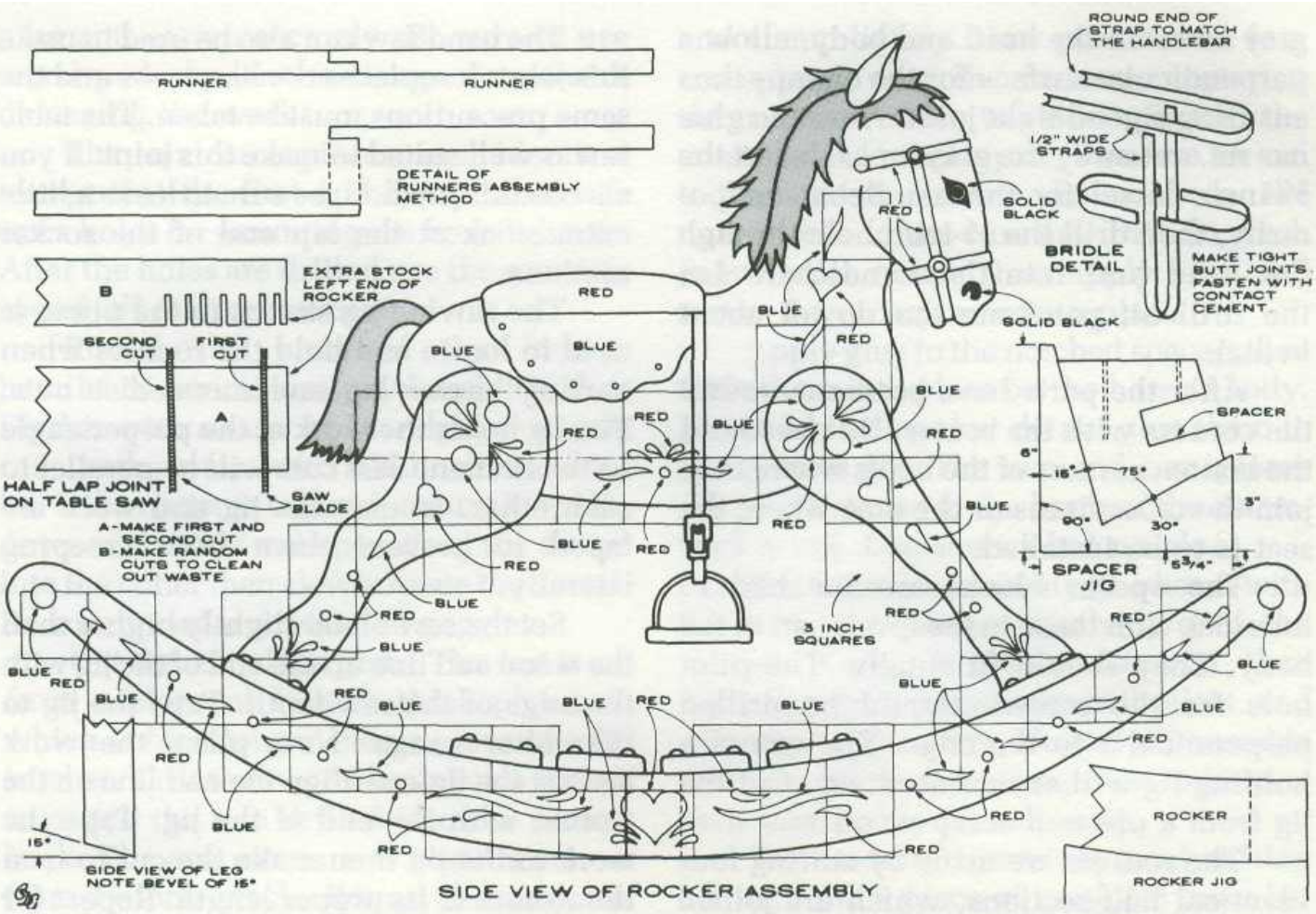

SIDE VIEW OF ROCKER ASSEMBLY

direction of the head and body should be perpendicular to each other for strength. The runners are also made in two sections because of their size and grain direction.

In the illustrations, each square equals 1 inch of the full-size plan. It's best to make a full-size pattern for each piece. When the layouts are complete, cut the wood pieces to shape using a jigsaw, band saw or saber saw.

Next, drill the holes in the face and legs. The two clusters of four 3/32-inch holes are for the harness rings and should be drilled through the stock. The two 3/16-inch screw clearance holes in each leg are drilled through the stock, but the larger 1/2-inch counterbored holes must be drilled from the outer surface of the legs. legs are mounted from opposite sides, the holes must be drilled accordingly, one set faceup and the other facedown.

Before joining the head to the body, drill the two 3/8-inch dowel holes into the mating surfaces. Make the holes 1 1/16 inches deep. Locate the holes accurately by using a doweling jig or dowel centers.

Because the bottom of the head is end grain, you will have to glue size the surface before joining the parts. To size the end grain, thin your glue with an equal amount of water, then brush onto the surface and allow to air dry. The parts can now be glued in the normal manner using the glue full-strength. Insert the dowels and clamp securely.

The clamping lugs, indicated by the

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gray areas on the head and body, allow a perpendicular surface for the clamps thus ensuring a good tight joint. After the glue has set, cut away the gray areas. Insert the ¾-inch dowel for the handlebar temporarily, then drill the ¼-inch hole through the head and into the handlebar. Let the drill bit penetrate the dowel about ¼ inch.

After the parts have been cut, round the corners with the router. Do not round the bottom corners of the hoofs where they join the crosspieces or the area where the seat is to be installed.

The spacer blocks are notched to interlock with those in the lower part of the body. They should fit snugly. The pilot hole for the screws should be drilled perpendicular to the edge. The use of a holding jig will ensure accuracy. Cut the jig from a piece of scrap wood.

The rockers are made by cutting four identical half-sections, which are joined with half-lap joints, all cut from the same side. Note that the ½-inch holes for the decorative buttons at the ends are not drilled from the same side; two must be placed on the opposite side so that when the rockers are glued up, all four ½-inch holes will be on the outside.

The half lap must be made carefully to ensure a clean glue line. There are several ways to do this; choose the method you are most comfortable with. Make the half lap one-half the thickness of the lumber and 2½ inches wide. If the joint is made by hand, use a back saw and cut close to the line, then finish with a chisel. Check the mating pieces frequently and try not to undercut them. If you do, you will have to use shims to correct the joint. When properly done, the outside surfaces should be flush.

The band saw can also be used to make this joint. It replaces the hand saw and the same precautions must be taken. The table saw is well suited to make this joint. If you choose this method, be sure to leave a little extra stock at the lap end of the rocker sections.

The sawing jig shown in the photo is used to locate and hold the rockers when making the end, lap, and intermediate cuts. The jig holds the work at the proper angle so the first and last cuts will be parallel to each other. In use, the jig and work are taped to prevent them from creeping laterally.

Set the saw blade slightly higher than the wood and line up the end of the jig with the edge of the saw tooth. Tape the jig to the miter gauge. Now place the work against the jig and align the end line on the runner with the end of the jig. Tape the work to the jig then make the cut to trim the runner to its proper length. Repeat for all four runners.

Now lower the saw blade so its height is exactly one-half the thickness of the runner stock. Reposition the jig, moving it exactly 2½ inches closer to the saw blade then again tape it to the miter gauge. Align the end of the runner with the end of the jig as was done for the first cut, then saw again.

The following cuts need not be measured. Make a series of cuts between the original cuts to clear out the waste. Make the kerf cuts close to each other to achieve the same effect as if you were using a dado blade. An alternate to this method is to use the dado blade to clean out the waste after the first and second cuts are made. Check that the parts fit together okay, then proceed to glue the half sections to make up the full length runners. Apply

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glue and clamp securely. Be sure to use wood pads under the clamps to prevent damaging the work.

The six crosspieces are identical except that the first and last pieces have extra holes for mounting the horse's hoofs. After the holes are drilled use the router to round off the top corners.

Round the ends of the ¾-inch handlebar which was previously drilled. Do this with a rasp and sandpaper or you can use the router with a 5/16-inch rounding bit. If the router is utilized, mount it upside down and use as a shaper. Feed the dowel into the cutter then slowly rotate the dowel. Be sure to wear protective goggles.

Cut the rest of the parts. The seat is cut from a piece of ¾-inch thick plywood, which is far stronger than a piece of solid lumber. Drill the two ⅜-inch holes spaced to match the two drilled into the horse's back. The eye pieces and nostrils are cut from ¼-inch stock. Round the edges of these with sandpaper.

After all pieces have been cut and rounded, they must be sanded for a superb finish. Two important areas when sanding are the joints at the halflaps on the rockers and the butt joint where the head is joined to the body. These must be sanded to remove the "step" if one exists between the two surfaces. Start sanding with 100-grit paper then work down to the finer grits of 120, 220, then 320. Pay particular attention to the end grain. The smoother the end grain, the finer the finish.

Start assembling by placing the rockers on a flat surface with the ends of the rockers aligned. The rockers should be spaced 16¼ inches apart. To simplify assembly, you may wish to cut two pieces of wood 16¼ inches long for use as temporary spacers. Place these spacers between the rockers and clamp lightly. Now position the four crosspieces onto the runners, centering them from side to side. Space the crosspieces ½ inch apart, then use an awl to locate the screw holes from the crosspieces to the runners. Drill 3/32-inch screw pilot holes, then apply glue and screw the crosspieces into place.

Apply glue to the notched spacers then slide them into place on the horse's body. Next add the legs but do not glue them to the spacers yet. The two end crosspieces are now fastened to the hoofs of the assembled horse. Use screws but no glue.

Place the subassembly (the horse with the two crosspieces attached) onto the runners. Center it from end to end, then mark the screw locations, drill pilots, and assemble with screws. If okay, disassemble the legs, hoofs and crosspieces, add glue then reassemble permanently.

The "saddle" is made by sandwiching a 1-inch-thick piece of urethane foam between the plywood and the vinyl. Trim the foam to the outline of the seat then squeeze the sandwich tightly using a clamp as shown. Pull the material taut and staple. When the clamp is removed, the foam will expand, leaving a nicely upholstered seat without wrinkles.

Note that the seat, flaps, mane, and so on should be installed after the finish has been applied to the wood.

Cut the saddle flaps with wavey outline as shown. Make one piece faceup and the other facedown as they are not symmetrical. Punch the holes either with a hole punch or with a nail with the point ground flat. Place the vinyl onto a piece of end-grain hardwood and strike with a hammer for a cleanly punched hole. Add the paper fasteners then spread the legs and cover them with a small piece of tape.

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The fasteners can be eliminated and decorative nails substituted. These would be driven into the body of the horse. The fasteners allow the saddle flap to hang loosely for a pleasing effect.

Make the stirrup as shown. The U-bolt is shortened by cutting away the threads as indicated in the drawing. Before installing it you may want to spray it with bronze paint so it matches the buckle. If so, rub the bolt with fine steel wool before spraying or painting.

The stirrup straps are nonadjustable. They are fixed at the height shown which has been determined to be the average height for this size horse. After the stirrups are looped through the buckle, coat them on the back sides with contact cement and join, eliminating the space between the two straps This is a safety precaution, eliminating the possibility of a child placing his head between the straps, a potential hazard. For this reason we do not recommend the use of reins.

Fasten the saddle flaps with staples along the top edge then install the stirrup straps using No. 6 screws and flat washers. Follow by adding the seat which is positioned with the two dowels. Press the seat down as far as it will go then secure it with the metal brackets. The seat is not glued because of the gathered vinyl on the underside.

The mane and tail are cut from a piece of 6-inch-wide fur. Before installing the mane, install the handlebar and pin it in place with the ¼-inch dowel. Install the mane with staples along its edges. Pull the hair away and staple only through the backing material. Use your fingers to "comb" the fur after it is installed.

The ears are made of vinyl. Cut the pieces as shown then apply contact cement and join them back-to-back. This will give the ears a finished vinyl surface on both sides. Install the ear flaps with screws and flat washers, placed slightly forward of center. Then fold the ear in half and cement the bottom to conceal the screw. Use vinyl cement or epoxy for this.

The tail is sewed along the seam into a cone shape. It is then fastened with a screw and flat washer. See detail.

Fasten the bridle straps with contact cement. Install the longer pieces first. The strap detail drawing shows a space between the various pieces. This was done only for clarity. Cut the parts so they butt against each other snugly.

After the bridle is in place install the rings. They are made of hardened steel which has been brass plated. Some may have a tarnished appearance. If so, rub lightly with steel wool to restore the color. A little clear nail polish will maintain the bright color. The best way to install the rings is to squeeze them on using a clamp. Place the four rings into the holes provided, then use a clamp to seat them. Be sure to position the clamp jaws so the rings seat squarely and not at an angle.

Finish the horse as desired. It may be stained, left natural, or painted as shown, If stained or left natural, it should be given a coat of sealer followed by several coats of brushing or spraying lacquer.

If you prefer to stencil the horse as shown here, give the entire project a coat of white undercoat followed by two coats of white semigloss lacquer or paint. The stencils are applied after the white coats have dried thoroughly. The acrylic colors used for stenciling are easy to use and dry fast.

You may wish to create your own stencils or use the shapes shown. These

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MATERIALS LIST

Except where noted, lumber is pine. All measurements are in inches.

Purpose	Size	Description	Quantity
Runner	1⅛" × 8" × 32"		4
Crosspiece	¾" × 4" × 18"		6
Front leg	1⅛" × 5¾" × 17"		2
Rear leg	1⅛" × 7" × 17"		2
Leg spacer	1⅛" × 3½" × 4⅞"		2
Body	1⅛" × 10½" × 22½"		1
Head	1⅛" × 11¼" × 12"		1
Stirrup	⅝" × 13/16" × 5"	Oak	2
Seat	¾" × 7" × 9½"	Plywood	1
Nostril	¼" × ¾" × 1"		2
Eye base	¼" × 1" × 2"		2
Screw	No. 6" × 1" RH		3
Screw	No. 10" × 3" FH		4
Screw	No. 10" × 2½" FH		4
Screw	No. 10" × 1½" FH		32
Eye	¾" dia.		2
Handlebar	¾" × 9"		1
Ring	⅞" dia.		4
Bridle strap	½" × 24"		2
U-Bolt	5/16" × 4"		2
Buckle, Western			2
Stirrup strap	½" × 24"		2
Seat, vinyl	10" × 12"		1
Saddle flap, vinyl	12" × 12"		1
Foam	1" × 7" × 9½"		1
Brace	1½" × 1½"		2
Paper fastener		Brass	10
Mane, long pile	6" × 16"		1
Tail, long pile	6" × 10"		1
Ear, vinyl	2½" × 3½"		2
Dowel	⅜" × 2"		4
Dowel	¼" × 3¼"		1
Button	1¼" dia. × ½"	Tenon	12
Button	⅝" dia. × ½"	Tenon	24
Staple	9/16"		1 box

Note: Altogether, you will need one piece of ⅝" × 12" × 12' pine, one piece of 1" × 10" × 5' pine, and one piece of ¾" × 7" × 9" fir plywood.

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may be cut from various materials, such as file folder stock, acetate, polyester or even tracing paper. The acetate and mylar should have a matte surface which will take pencil. We recommend the acetate and polyester as they are translucent and durable.

Lay out the designs selected onto the stencil material, then cut with a sharp knife. We used an Exacto with a No. 11 blade.

Errors can be minimized by coating the stencil back with adhesive. We used a spray adhesive (3M Company) which has a low tack when sprayed on only one surface. Allow the adhesive to dry five minutes before using the stencil.

Position the stencil on the work then use a stencil brush to apply the color to the work. In stenciling, it is very important to remember that the brush should be almost dry. Dip just the tip of the brush into the jar of paint, and no more than 1/16 inch deep,then rub it on paper towels to remove most of the paint. Rub in 2-inch circles. Repeat several times. Now you can apply it to the work. Dab the brush onto the stencil. Keep on dabbing until the desired shade is achieved.

Note that some of our patterns consist of lefts and rights. You can use one pattern for both, but you will have to clean the stencil of paint and adhesive before reusing it. It may be simpler to just make new stencils. Just trace one set faceup and the other facedown.

The bridle and stirrup straps are available only in light brown. To match your stenciling colors, first give them a base coat of white then apply the desired color.

A full-size plan for building this rocking horse is available from *Armor Products* (see Introduction for address).

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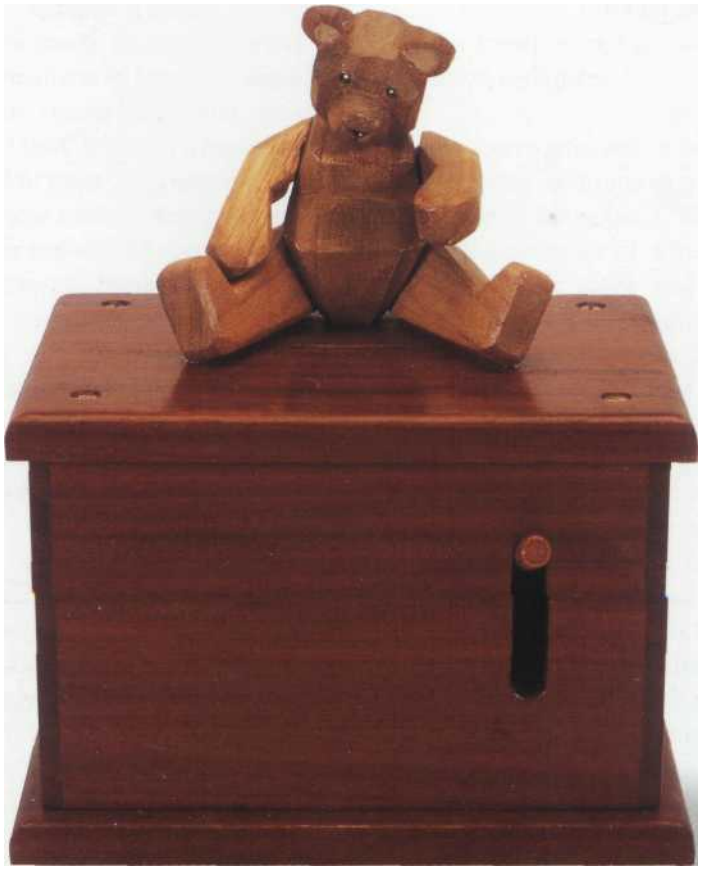
Teddy Bear Bank



When I was a kid about six years old or so, I was obsessed with money! Or as my brothers would have said—still say—I was a "Mr. Mean," a scrooge, a **tightwad,** a hoarder, a miser. Whenever my relatives came around for a visit, I would smile and give kisses, and generally do all the things most kids of that age hate to do, in the hope that my oh-so-wonderful behavior would put me in line for a monetary handout.

It rarely failed! When the moment came to say good-bye, my sycophantic behavior usually paid off, with my doting uncles and aunts vying with each other to give me all their loose change. The funny thing was, I didn't really care about the money as such, I simply enjoyed putting coins in my automated money box!

This project draws its inspiration from my long-gone toy—when the lever is pushed down, it causes the coin to fall through the slot, and causes the bear to raise his arm and nod his head.

MAKING THE TEDDY BEAR BANK

Having studied the working drawings for making the box and carefully selected your wood, set out the various dimensions and cut out the ten component parts—the four sides, the base, the top and the four inside-corner fillets. Cut the rabbets at the corners and glue up. Round over the edges of the base and lid with a quarter-curve profile and fit with countersunk screws.

Trace the side-view profile of the bear through to your chosen wood—best if it's a soft easy-to-carve timber like lime, jelutong or basswood—and cut it out on the scroll saw. Rerun this procedure for the front views. You should finish up with six parts—the head, the body, two arms

and two legs. Drill 1/2"-diameter holes down through the body, up into the head, through the shoulder and into the arm, and fit stubs of 1/2"-dowel for the neck and for the jointed arm.

When you have made the basic parts for the bear, use a knife to swiftly whittle the cutouts to shape. Don't try for anything fancy, just go for uncomplicated and stylized chunky forms.

Finally, having first used a scalpel and sandpaper to tidy up and create a good finish, use a dash of black acrylic paint to detail the nose, eyes and mouth.

PUTTING **IT TOGETHER**

Once you have made the box and all the parts that go to make the bear, then comes the difficult task of putting the whole thing together. It's not so much that any single stage is difficult, but that everything has got to be just right. If one of the control strings is too slack, or the shaft is too tight, or whatever, then the movement won't work.

Start by running 1/16"-diameter holes through the neck and arm stubs. The neck needs a side-to-side hole for the pivot and a front-to-back hole for the control cords, while the arm needs a single front-to-back through-hole for both the control cords and the pivot strings. In essence, the controls are beautifully simple. There are four cords— one to pull the head down, one to pull the head up, one to pull the arm down and one to pull the arm up. And of course, depending upon how you want the action to go, fix either the "up" or the "down" cords to a lightweight tension "pulling" spring so the lever action becomes the positive movement.

Finally, when you are happy with the movement, cut two slots in the box (one for the lever and one for the coins), fit the shaft with its dowels and end plates, glue-fix the bear to the top of the box, run the control cords down into the box and then variously tie the cords to the spring or shaft.

MATERIALS LIST—

TEDDY BEAR

A Head (1)	2″×2″×2″
B Body (1)	2″×2″×3″
C Arms (2)	1″×¾″×3″
D Legs (2)	¾″×2″×3″

Note that all the above pieces are oversize and allow for cutting waste.

BOX

E Front (2)	3″×4¼″×6½″
F Shaft plates (2)	¼″×2″×2″
G Top (1)	½″×5½″×7½″
H Bottom (1)	½″×5¾″×7¾″
I End (2)	⅜″×5″×4¼″
J Corner fillets (4)	⅝″ triangular section at 4½″ long

HARDWARE AND EXTRAS

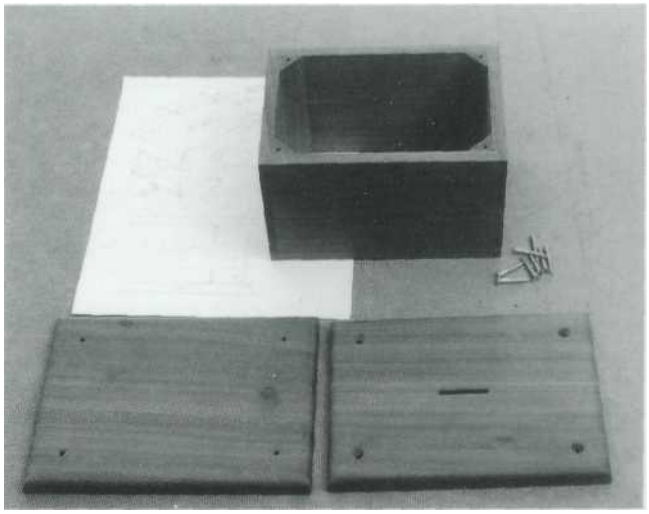
K Drive shaft (1) broomstick dowel—cut to fit
L Slot and lever bars (2) ¼″ dowel—cut to fit
M Strong cord—to fit
N Brass screws—various
O Small quantity of black acrylic paint

Note that all box measurements are to size.

SPECIAL TIP: GLUING

For swiftly fitting and fixing all the control cords, you can't do better than a cyanoacrylate. It's good for holding the knots tight, for little trial-and-error holds, for fixing the bear to the top of the box. In fact, it's just about perfect for everything.

STEP-BY-STEP STAGES



The finished box, with the bottom and top slabs ready to fit. Note how the fixing screws are placed so they run into the corner fillets.

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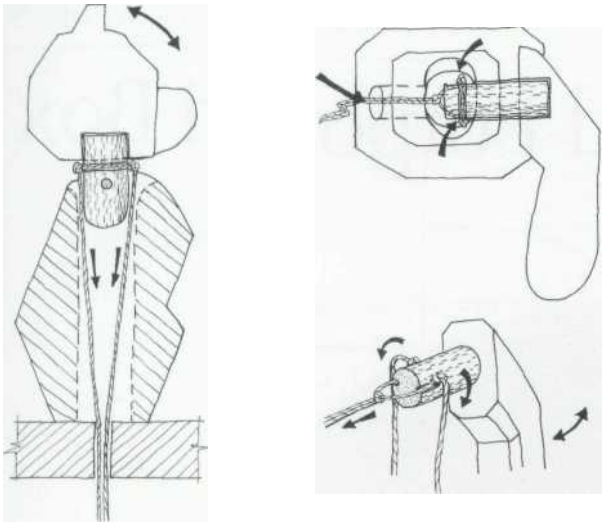
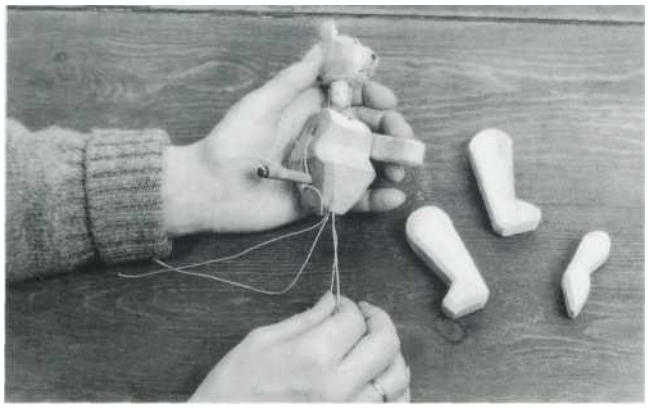


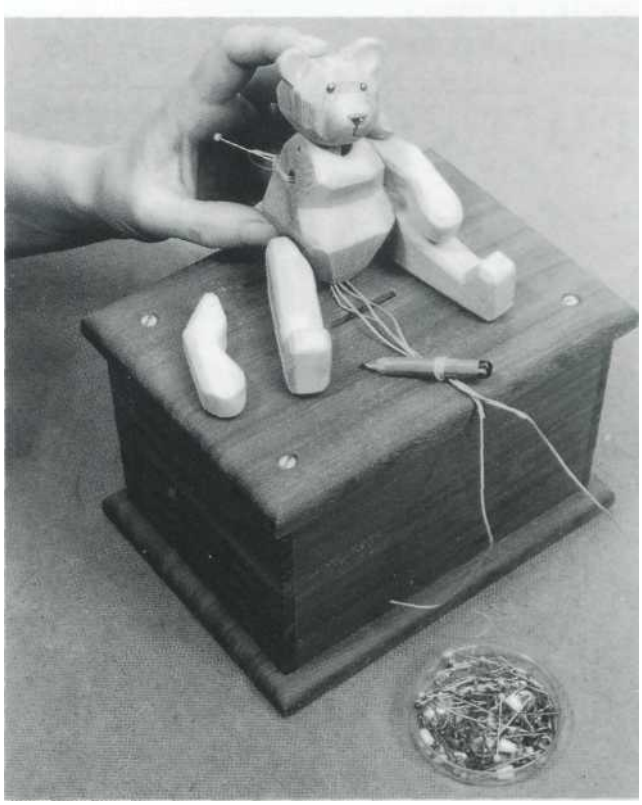
2. Next we string the bear. This cross section shows how the control cords operate the up-and-down movement **of** the head on the pivot. Be sure to use strong twine and nonslip knots. Notice the plan view at top right, show ing how the arm is both pivoted and controlled by the cords. A detail **of** the cord is shown at bottom right. See how one cord pulls and pivots the arm, while the other two cords operate the up-and-down movement.



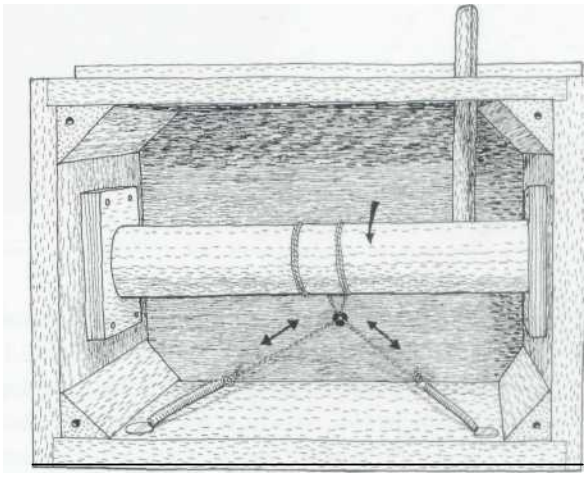
3 Have a **dry** run before you start gluing and fixing. Notice how 1 have left plenty of length to the cords.

SPECIAL TIP: MODELS

If **you** can't **figure** out how the movement works, make a working model with a card, pins and rubber bands. Make a card cutout **of** a bear, fix it to a board with thumbtacks at the joints, and then run cords from the various limbs in such a way that a pull-down on the cord results in the limb flipping up. If you now have rubber bands to pull the limbs back into the original position, then you have achieved an archetypal string-and-spring movement.



Sit the bear in place on top of the box and establish the position **of** the cord hole. If necessary, sand the various mating faces of the limbs and the body, so as to adjust the pose.



5 A view into the underside of the box shows the fixing of the four cords. One cord each from the arm and the head run down to the springs, while the other two cords are wrapped and glued around the shaft. In action, the lever turns the shaft, with the effect that the strings pull down on the arm and head.

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Cheese and Wine Cart

HOME CRAFTSMEN are often discouraged from makinga rolling cart on wheels because they don't have a lathe for the spokes. This elegant cart was designed and built without a lathe. The turnings are ready-made and available at most lumberyards and home-improvement centers. Even the wheel hubs and rims are made with conventional tools: a router and saber saw.

The cart is made of ¾-, 1⅛-, and 1⅜-inch pine stock (nominal sizes, 1, 1¼, and 1½ inches). It measures 18 × 29 × 29 inches and has a roomy drawer for storing odds and ends. Most rolling carts have a movable hand grip, which must be dropped out of the way to permit the drawer to open. We used a fixed hand grip and simply made the drawer open from the front. It looks better and is more practical.

Make the top of the cart of 1⅜-inch pine. Glue up four boards, each 5 inches wide, to obtain the necessary width. Note that the Materials List shows the lengths to be 3 inches longer than the finished size. You will trim away the excess after gluing. Dowel pins are necessary to ensure a good, permanent glue line. To prevent warping, invert the first and third boards so the annular rings will alternate. Use four dowels in each section, locating them carefully. If you have a doweling jig, you will be able to center the dowel holes automatically. If you do not have a jig, drill the holes in the first board, then use dowel centers to transfer the location of the holes

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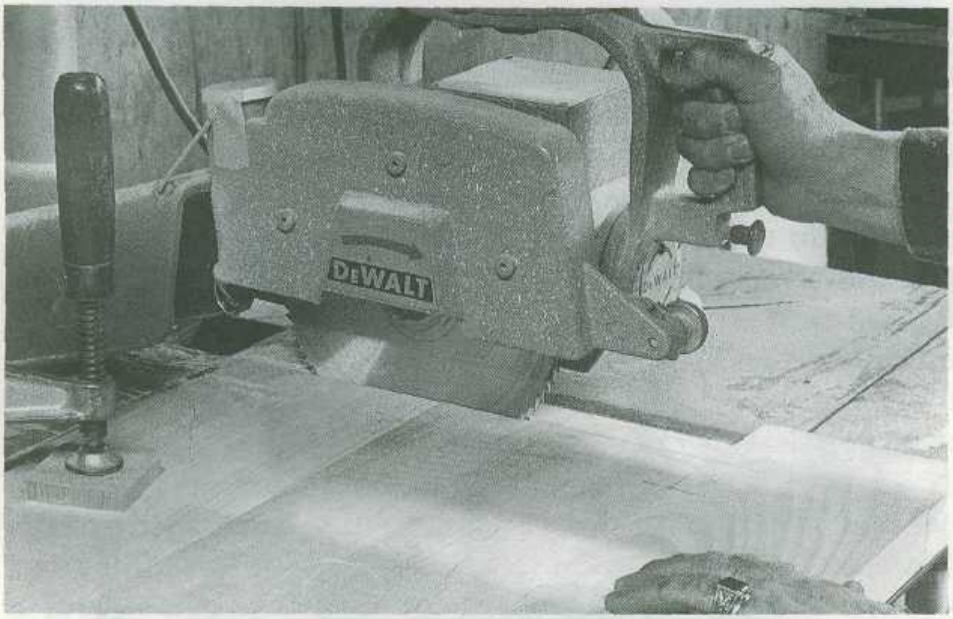

Fig. 7-1. Top panel is made by doweling and gluing several boards together. When the glue dries, trim the excess at the ends of the panel.

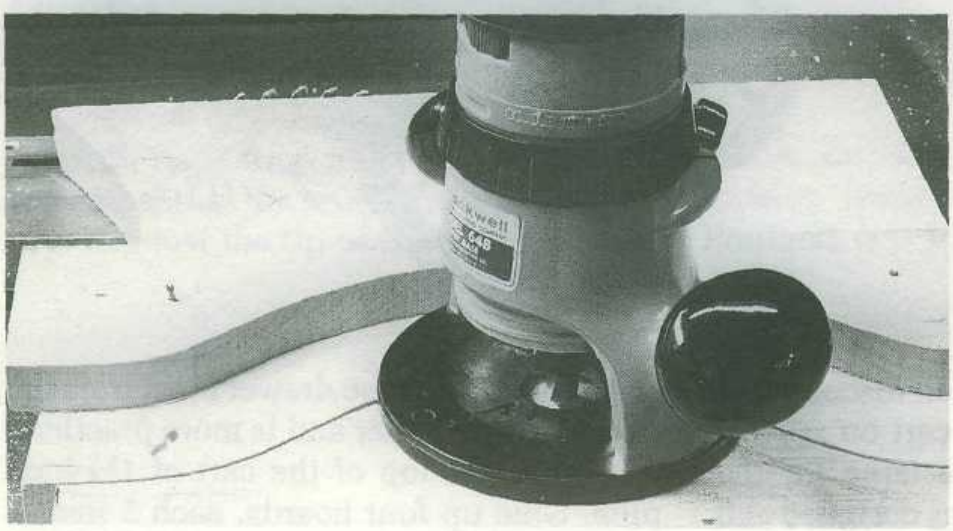

Fig. 7-2. Make the decorative bead on the end panels with a router. Make a wooden template (see diagram) for the router base to follow.

to the mating board. Repeat for the four boards, then apply glue and clamp. After the glue sets, trim the ends to size.

If the surface joints are uneven, use a belt sander to even the surface. Belt sanders cut fast, especially on pine, so use care when sanding. Start with a medium-grit belt, followed by fine.

Make the upper rails of 1⅛-inch stock. After ripping the pieces to width, run a groove along the lower edge using the router fitted with a V-shaped cutter. Tack a wood strip to the rail to guide the cutter. You will need two side rails and one rear rail. The front is left open for the drawer.

Make the lower side rails in a similar manner, but narrower. The front and rear rails are a bit more tricky to make.

The upper edge must be contoured. In addition, the upper edge is contour grooved. This process requires that you use a shaped wood template to guide the router. Trace the contour of the end panel onto a piece of scrap about 2 inches longer than the panel. Use a narrow piece of wood for the template strip and nail it to the base

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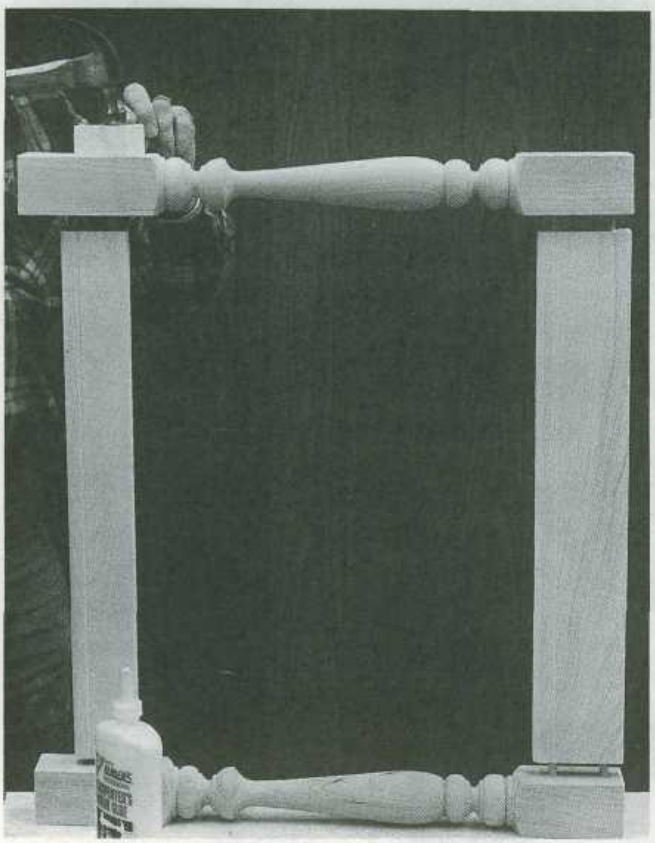

Fig. 7-3. Using ready-made legs saves a lot of work. Cut the legs to size and join to the apron with glue and dowels. Use the block to protect the legs.

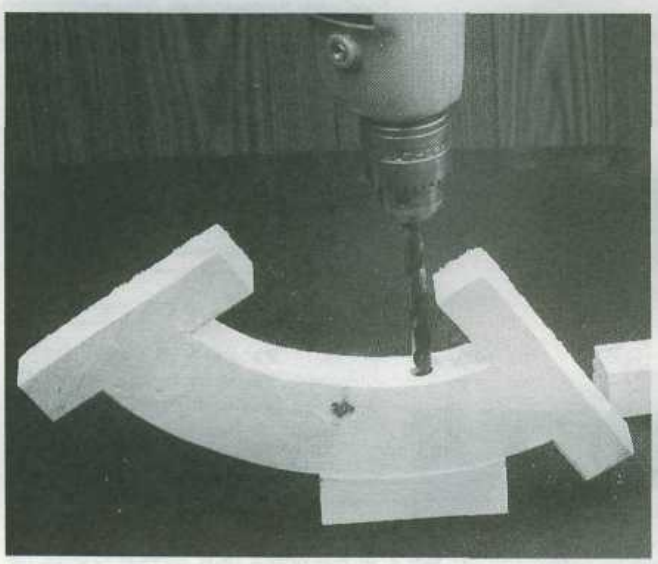

Fig. 7-4. The rims for wheels are made in four sections. When cutting curved rims, leave end tabs for later assembly. Predrill for spokes.

piece. To contour-cut it parallel to the shape of the panel, you need to use a marking gauge to draw the shape of the template. (To set the gauge, measure the radius of the router base, then add ½ inch.) Trace the shape onto the guide strip and cut with a saber saw. Fasten the strip to the base with a couple of nails, then place the panel into the shaped base. Hold it securely with a stop on the table or with a clamp.

Cut the ⅜-inch deep groove in the rail pieces. They are for the top fasteners. Locate the groove ½-inch from the top edge. The width of the saw kerf is not important. Cut the lower shelf to size, but do not notch the corners yet.

The legs are standard 3- × -32-inch turnings available at your lumberyards. Since the finished length required is 24½ inches, you will need to trim the lengths to size. The square block at the top should measure 5 inches and the lower one 6 inches. (See drawing.) *Note:* If you have a lathe, simply make a template on kraft paper, then turn in the usual manner.

Use the doweling jig to locate and drill the ⅜-inch-diameter holes at the ends of

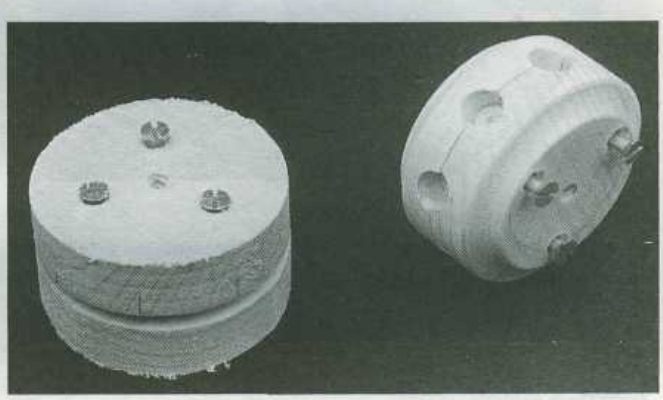

Fig. 7-5. Cut hubs from ¾-inch stock, then saw in half. Reassemble with wood screws and drill for spokes. Hubs are cross-grain for strength.

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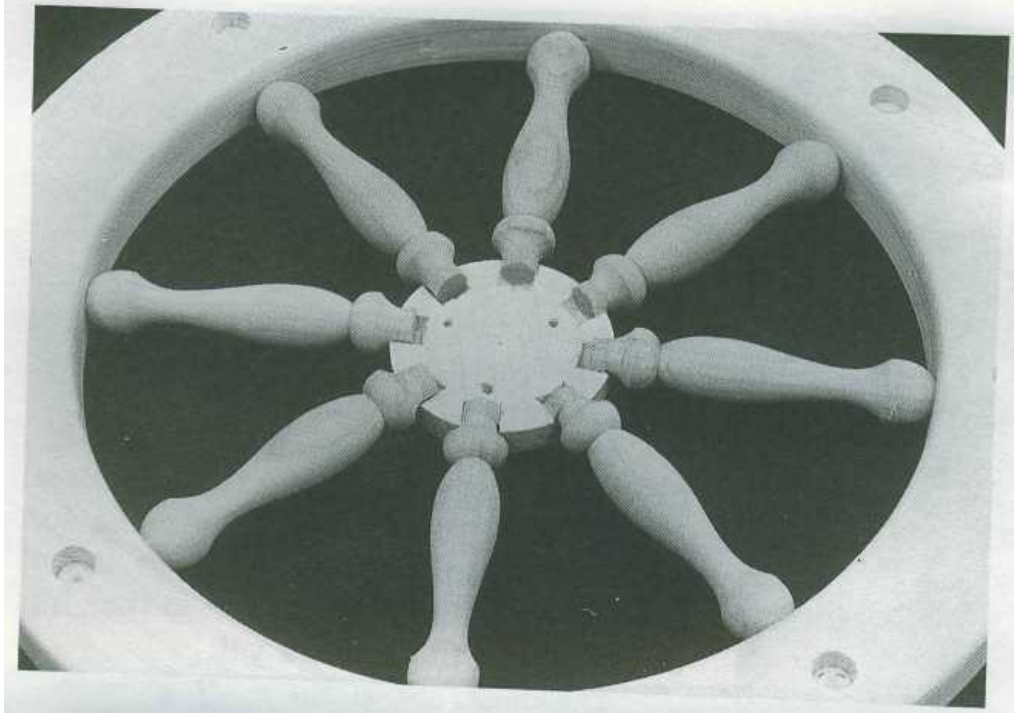

Fig. 7-6. Separate hub halves, insert spokes, glue, and rejoin hubs with screws. Make the spokes from ready-made spindles cut in half.

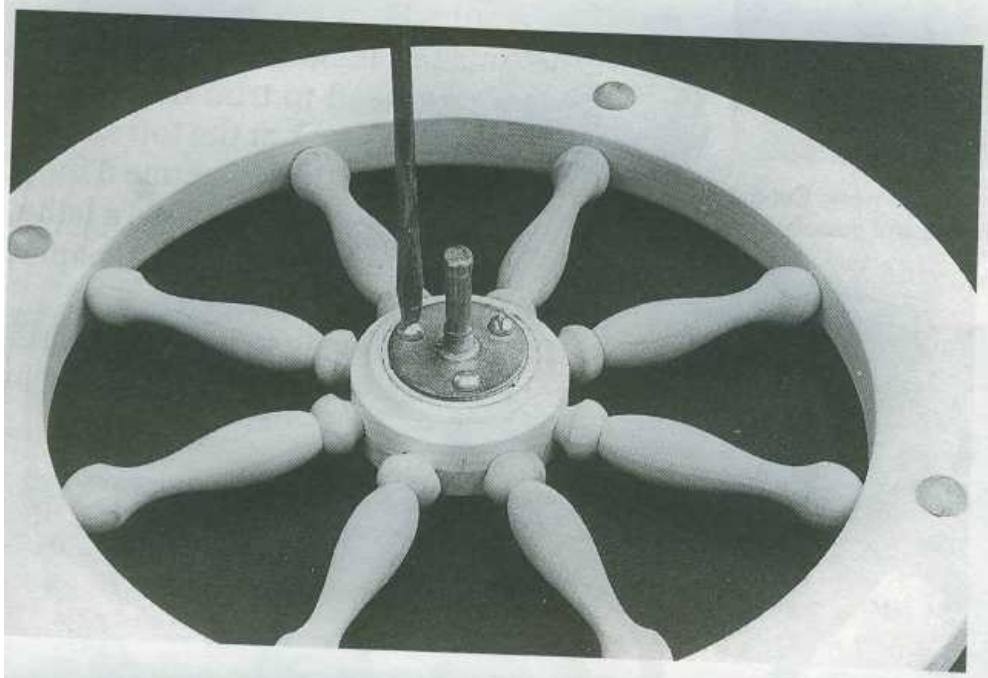

Fig. 7-7. Attach the wheel shaft to the hub with three screws. The metal stem will snap into the socket that is placed in the leg.

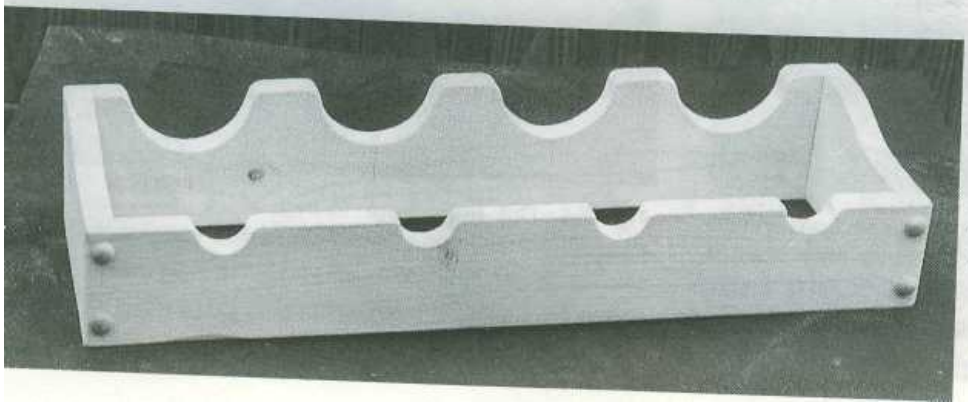

Fig. 7-8. The wine rack is removable. Cut the bottle rests so that bottles lie with necks down. Add wood buttons for looks.

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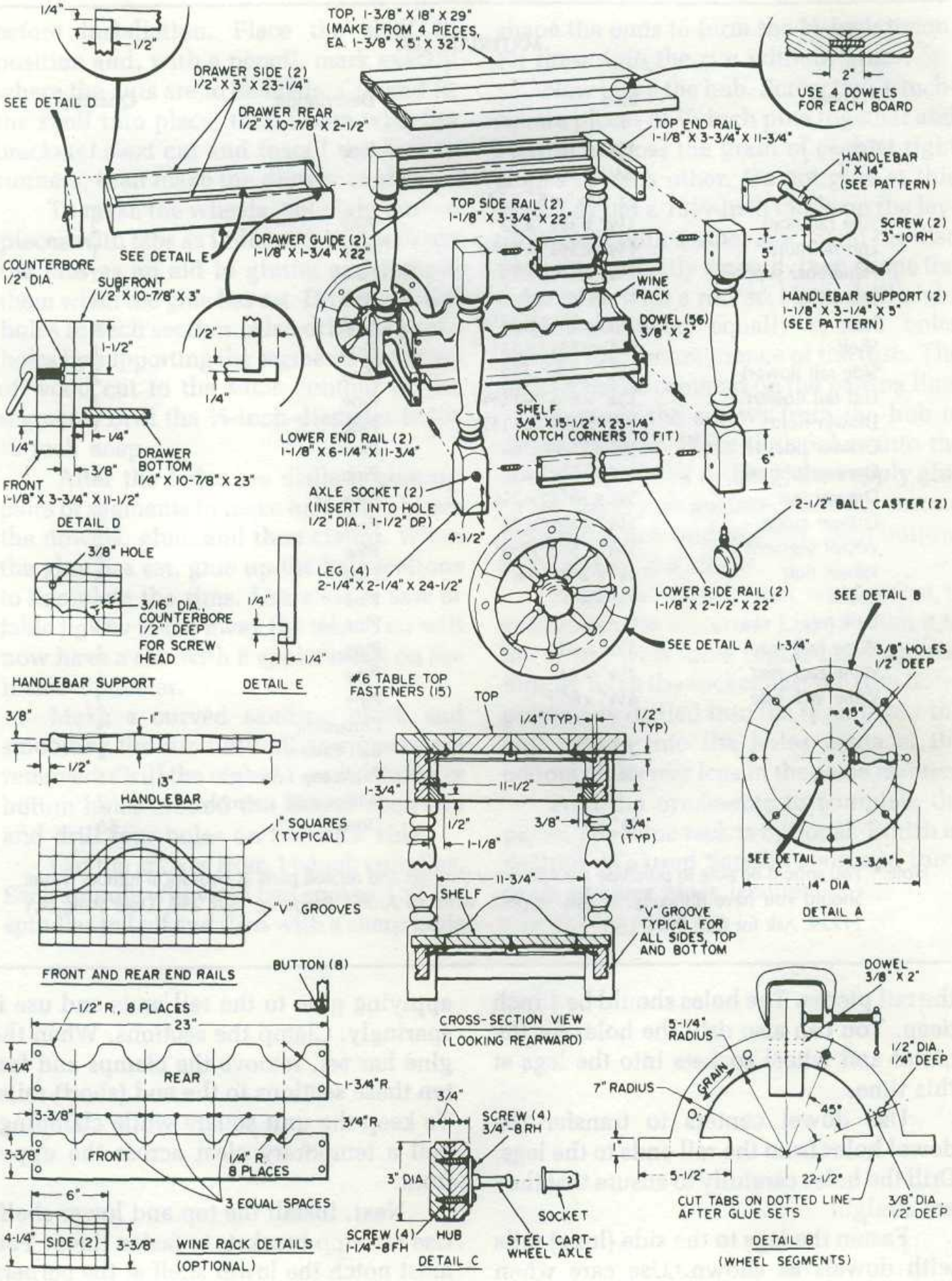

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MATERIALS LIST

Purpose	Size	Description	Quantity
Top	1⅜" × 18" × 29" (Make from 4 pieces, ea. 1⅜" × 5" × 32")	Pine	1
Side rail (top)	1⅛" × 3¾" × 22"	Pine	2
End rail (top)	1⅛" × 3¾" × 11¾"	Pine	1
Handlebar support	1⅛" × 3¼" × 5"	Pine	2
Handlebar	1" × 14"	Pine	1
Leg	2¼" × 2¼" × 24½"	Pine	4
Shelf	¾" × 15½" × 23¼"	Pine	1
Side rail (lower)	1⅛" × 2½" × 22"	Pine	2
End rail (lower)	1⅛" × 6¼" × 11¾"	Pine	2
Drawer front	1⅛" × 3¾" × 11½"	Pine	1
Drawer side	½" × 3" × 23¼	Pine	2
Drawer subfront	½" × 10⅞" × 3"	Pine	1
Drawer rear	½" × 10⅞" × 2½"	Pine	1
Drawer guide	1⅛" × 1¾" × 22"	Pine	2
Wheel segment	1⅛" × 5" × 12½"	Pine	8
Wheel hub	¾" × 2¾" dia.	Pine	4
Spoke	¾" × 4¾"	Pine	16
Buttons	½" × ⅝"	Pine	32
Wine rack front	3⅜" × 23"	Pine	1
Wine rack rear	4¼" × 23"	Pine	1
Wine rack side	4¼" × 6"	Pine	2
		Ornament	3
	2½"	Ball casters	2
	#6	Table top fasteners	15
		Wheel axle assembly	2
	⅜" × 2"	Dowels	56

Note: You should be able to purchase the necessary turnings and related parts at your local lumber dealer. Should you have difficulty in this respect, write to Armor Products, Box 290, Deer Park, N.Y. 11729. Ask for Cart Price List.

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the rail pieces. The holes should be 1 inch deep. You can also drill the holes for the caster and wheel sockets into the legs at this time.

Use dowel centers to transfer the dowel holes from the rail ends to the legs. Drill the holes carefully to ensure that they are straight.

Fasten the legs to the side (long) rails with dowels as shown. Use care when applying glue to the rail ends and use it sparingly. Clamp the sections. When the glue has set, remove the clamps and fasten these sections to the end (short) rails. To keep the unit square while clamping, nail a temporary cleat across the upper front.

Next, install the top and lower shelf. Use tabletop brackets to fasten them. You must notch the lower shelf at the corners

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before installation. Place the shelf in position and, with a pencil, mark exactly where the cuts are to be made. Cut and fit the shelf into place, then fasten with the brackets. Next cut and install the drawer runners, then make the drawer as shown.

To make the wheels, cut eight curved pieces with tabs as indicated.You will use the tabs as an aid to gluing and remove them when the glue has set. Drill the dowel holes in each section. Also drill the spoke holes by supporting the segments in a scrap of wood cut to the same contour as the segment. Drill the ⅜-inch-diameter holes ½ inch deep.

After the holes are drilled, glue up pairs of segments to make half rims. Insert the dowels, glue, and then clamp. When the glue has set, glue up the half sections to complete the rims. Use a saber saw or table jigsaw to cut away the tabs. You will now have a rim with 8 spoke holes on the inside diameter.

Make a curved sanding block and smoothen the rim until all saw marks are removed. Drill the eight ½-inch- diameter button holes around the face of each rim and drill four holes on the back side.

Cut the spokes from 11-inch spindles. Each spindle will yield two spokes. Cut the spindles in half and then with a sharp knife shape the ends to form the ⅜-inch tenon. Fit these into the rim without glue.

Now make the hub. Screw two 4-inch-square pieces of ¾-inch pine together and be sure to cross the grain of each at right angles to each other. Do not glue at this time. Lay out a 13¾-inch circle on the lay-up and cut with a saber saw. Sand the disc until it is perfectly smooth, then shape the outer edge with a router. Next, drill eight ⅜-inch-diameter, equally spaced holes around the circumference of the disc. The holes must be centered on the parting line.

Remove the screws from the hub to disassemble it. Place the spokes into the sockets formed by drilling, then apply glue to the inner hub surface. Add the second half of the hub and rescrew. Add buttons to complete the wheel.

A special wheel shaft with socket is available. (See Materials List.) Fasten it to the wheel with three round-head screws. Simply force the socket part into the holes previously drilled into the legs. Insert the ball casters into the holes made at the bottom of the rear legs in the same manner.

Add the ornaments to complete the piece. The wine rack is optional. Finish as desired. We used Sapolin stain and three coats of clear gloss lacquer.

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Chessboard Game Table

PRIMARILY A GAME TABLE which can be used for playing numerous games, this table features a solid-block chessboard made of light-and-dark-colored squares, glued together and easily made. The roomy drawer will hold plenty of games and other supplies. Leatherette panels at each side of the chessboard add to its elegant appearance.

In the game of chess, the board is placed so that each player has a white square at his right hand. The table shown is for end seating, however if you desire, you can position the board so the players sit at the long sides. The pull-out trays will hold your favorite drink or snack.

Construction of this table is simplified by making use of ready-made legs. These are available at most lumberyards and department stores and they come in various styles and sizes. For this game table, a tapered Italian provincial design 28 inches tall was selected. For the ambitious woodworker, the legs can be made without difficulty, using the table saw for cutting the tapers and the router for fluting.

Assuming you are using the ready-made legs, check the lengths carefully, for although they are made by machine and should be uniform in length, there is sometimes a variation of ⅛ inch between units. If you find this so, recut the legs to make them all equal. Break all sharp edges with fine sandpaper, then set the legs aside.

The aprons are cut to size from a straight piece of poplar or maple. The two end pieces are then notched along the top edge to allow clearance for the sliding trays. The depth of the notch depends on the thickness of the lumber you use. For example, 1-inch-thick stock will be either ¾-inch thick or 13/16 inch. Most pine purchased at the lumberyards will be ¾-inch thick but the hardwoods, in most cases will be 13/16 inch. For our purpose, we

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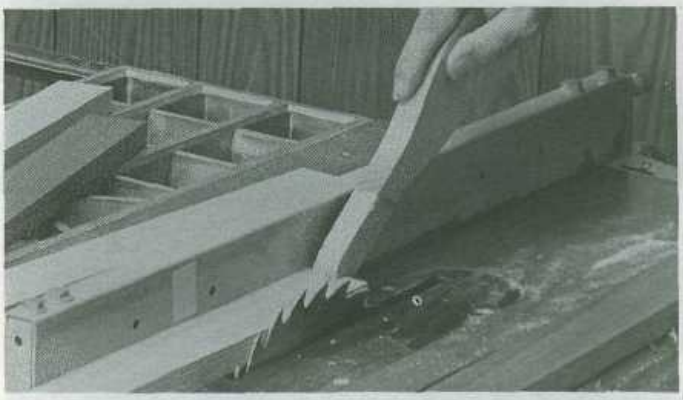

Fig. 8-1. To make the chessboard, begin by cutting strips of ash and mahogany for the light and dark colored squares.

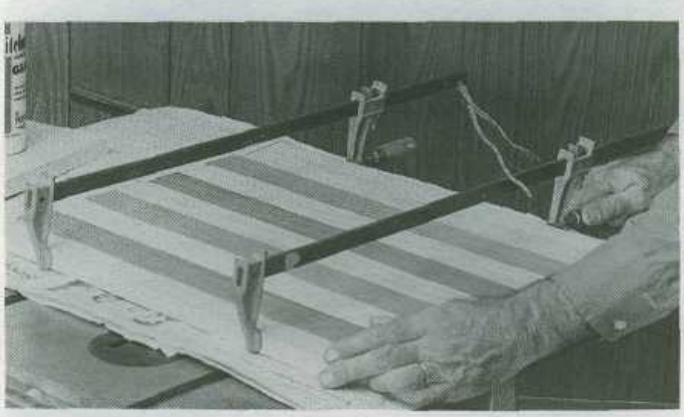

Fig. 8-2. Assemble and clamp the strips in an alternating pattern. It is important that this is done on a flat surface.

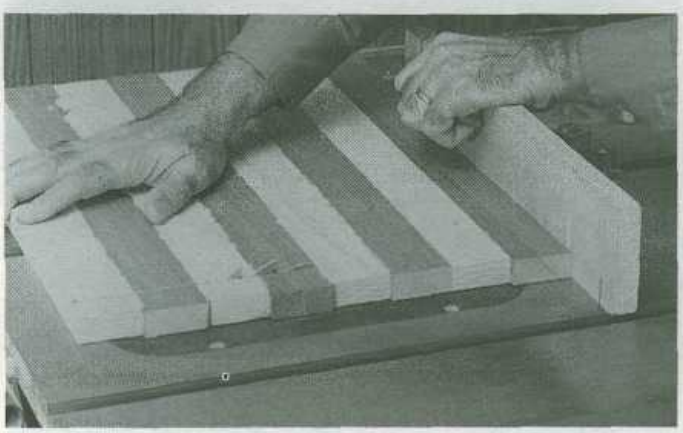

Fig. 8-3. The next step is to true-up the assembled block. Here, a miter gauge is being used to make these cuts.

want the notch to be 1/16 inch deeper than the thickness of the trays so that it will slide without binding.

The notch can be cut in several ways, but the method shown is preferable as it results in straight smooth cuts. Lower the blade of your table saw until the teeth are below the table surface. Set the fence to the desired width of cut, then position the work against the fence. Holding it firmly, turn the power on and raise the blade. A mark on the fence is used as a guide for the start of the cut. Slowly feed the work until the length of the notch is cut and use the miter gauge to cut the ends of the notch.

The decorative groove along the bottom edge of the apron is cut next. Use the router with a V cutter for this operation.

The legs are held to the apron with round-head screws. To locate the diagonal screw holes accurately, make a drilling jig with two pieces of scrap wood. Hold the jig tightly when using and drill two holes in the ends of the three apron sections. The

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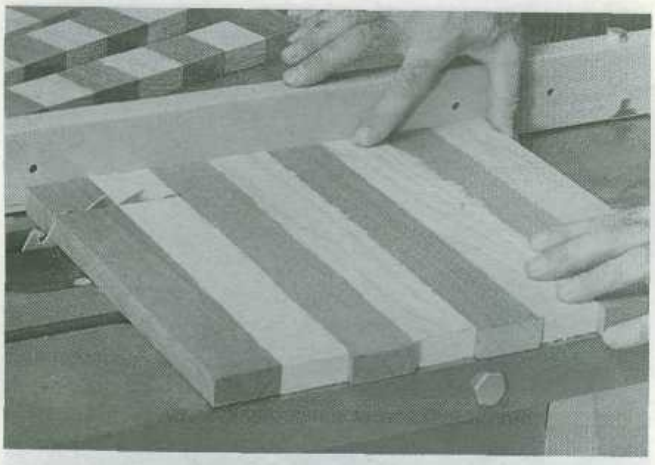

Fig. 8-4. Having cut out the blocks, you will then have to prepare for the assembly and gluing step. Because all of the gluing in this operation will be with cross grains, it will be necessary to first size all of the edges with thinned-out glue.

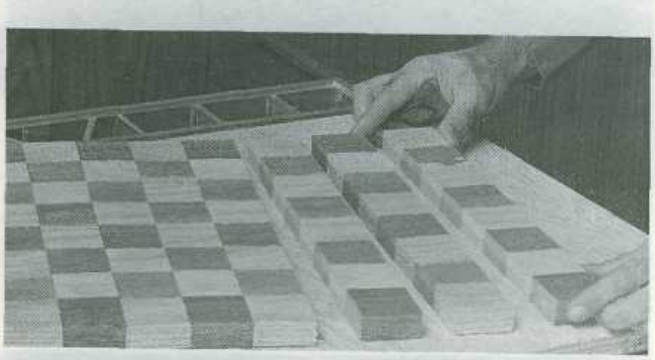

Fig. 8-5. Set the fence to recut the block so that each square measures 1⅞ × 1⅞ inch. Use a mark on fence as guide.

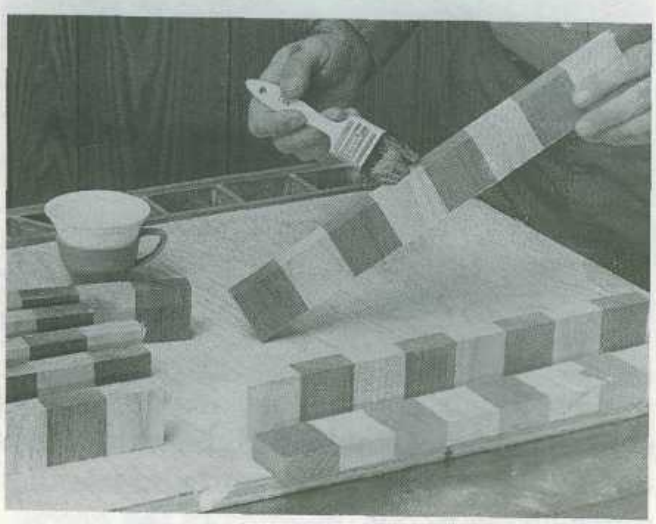

Fig. 8-6. When the application of thinned-out glue has dried, you can assemble, glue, and clamp the blocks together. By reversing every other block, you will obtain the checkerboard pattern. Make certain you are again working on a flat surface.

front drawer support is also assembled at this time. Use screws and glue at all joints.

The trays are made of the same stock as the apron. Cleats attached to the rear serve as stops to keep the trays from being pulled out too far. Two cleats screwed to the underside of the top limit the closing travel of the trays so that the front edge of the tray closes flush with the apron. Runners for the tray prevent sidewise swaying. The drawer runners are assembled, then screwed to the lower part of the side aprons.

The chessboard is made up of alternating light- and dark-colored wood squares, in ash and mahogany. Rip four strips each of the ash and mahogany woods to exactly 1⅞ inch wide, then glue these

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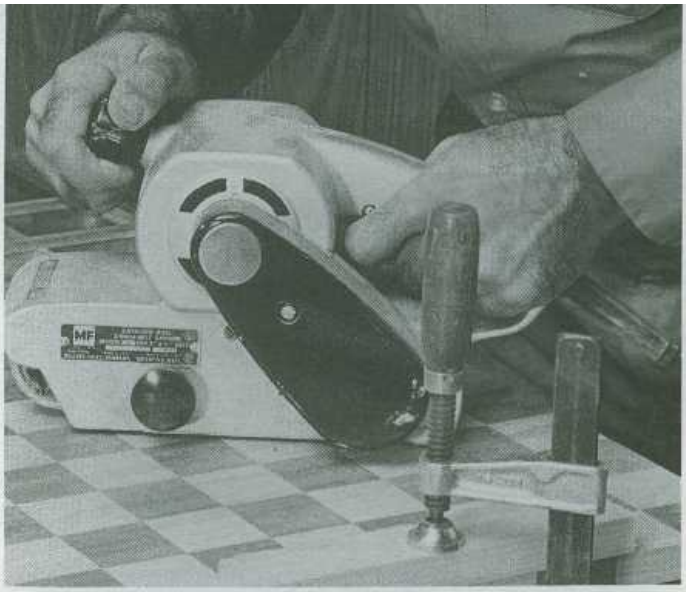

Fig. 8-7. After the glue has set, sand the surface of the chessboard to produce a flat, even surface. A belt sander is best.

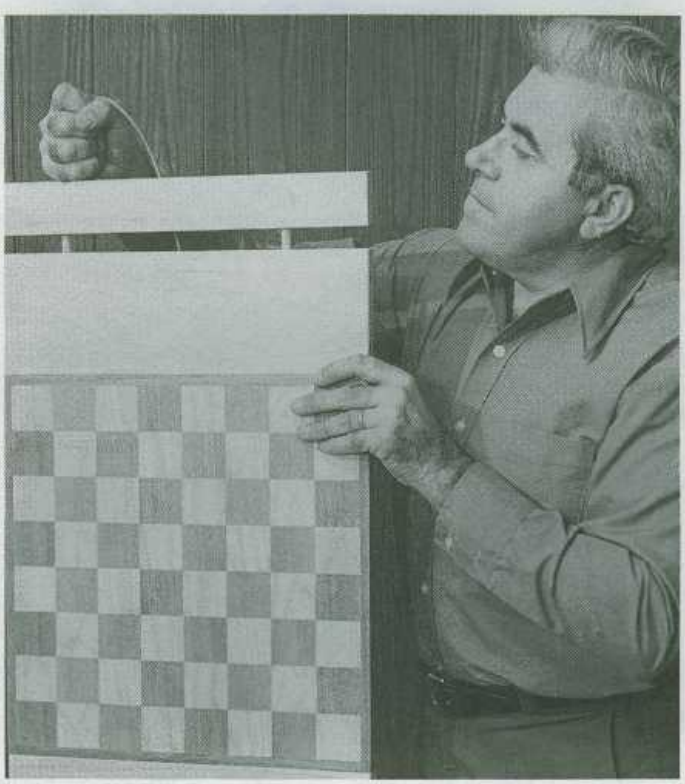

Fig. 8-8. Note the dowels used in assembling the tabletop sections. You should do ends first, and then the long sides.

alternating dark and light strips as you go. If you have trouble getting the ash, any other light-colored wood, such as poplar or maple, may be substituted.

When the glue has set, cut apart the striped block to 1⅞-inch widths. Remove all splinters or burrs with fine sandpaper. Next, glue to form the chessboard pattern and since all gluing in this operation will be cross-grain, be sure to size the edges using thinned down glue. Apply with brush to all edges and allow to dry about twenty minutes. Then apply glue full strength as it comes from the container, and clamp firmly.

The table saw is a good place to work as the surface is flat. Protect the top with newspaper when clamping. When the glue

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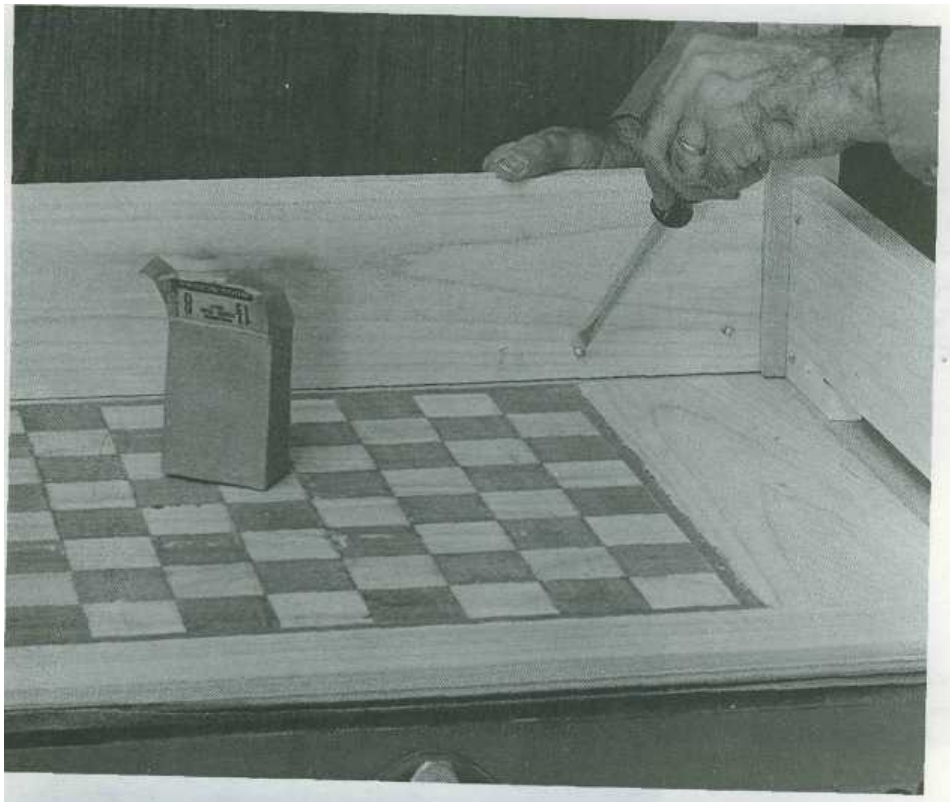

Fig. 8-9. The apron is attached to the tabletop with round head screws which angle in through the pre-drilled holes.

Fig. 8-10. Drawer is of simple construction, using a double front. Screws in front panel can be removed after glue sets.

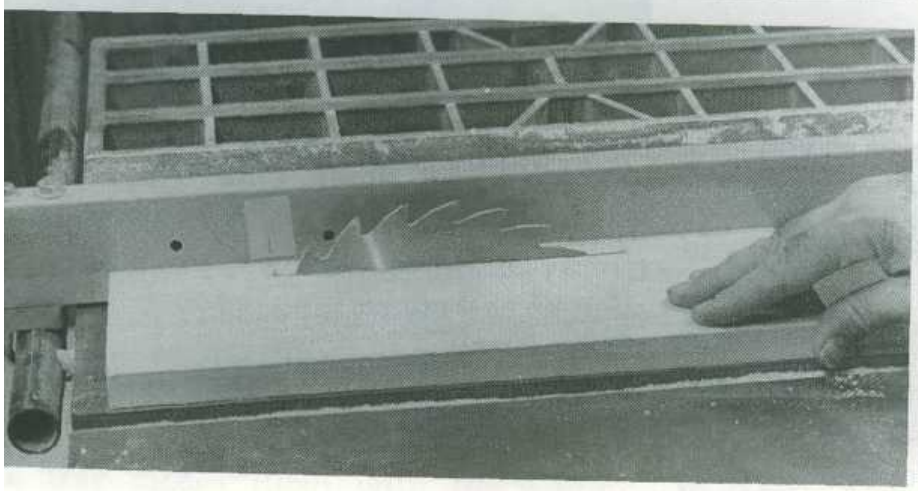

Fig. 8-11. The notching for the end panel trays is done by raising the saw blade as the work is held in stationary position.

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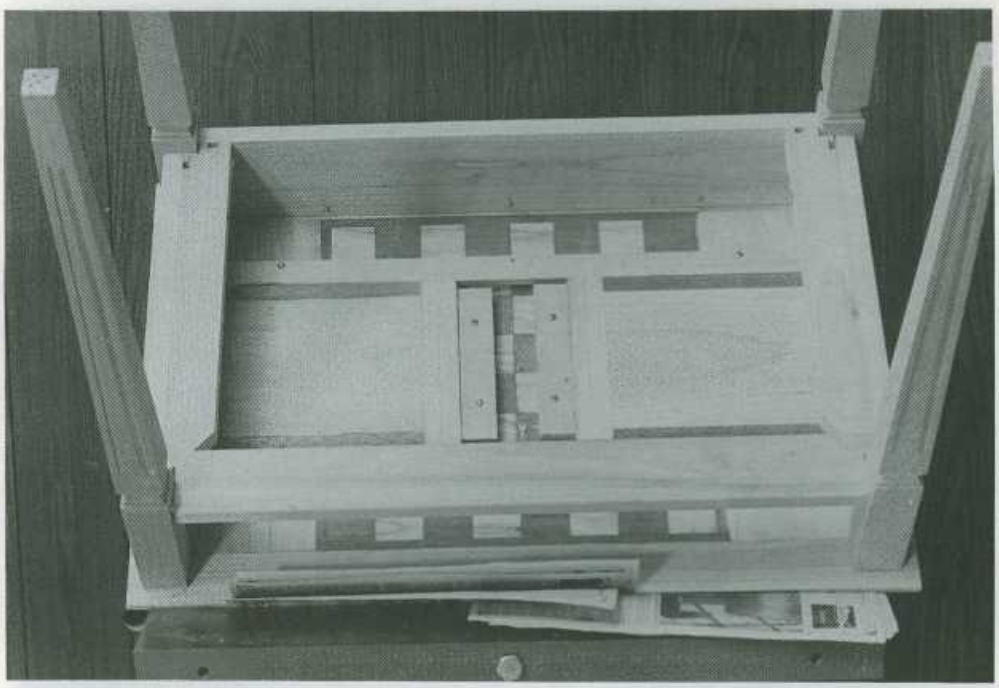

Fig. 8-12. This view shows the trays in closed position. Cleats will limit their travel to keep fronts flush with the apron.

Fig. 8-13. Pictured is the completed table before the finish is applied. Lion head pulls are on drawer; knobs go on the trays.

has set, sand the surface flat using a belt sander. Start with an 80-grit belt then work up to 120 and finally finish with a finishing sander and 220 paper.

Add the trim of dark wood all around. The leatherette panel is mounted independently of the ends. The reason for this is the bevel at the top edge of this panel. The small bevel is made before the panel is installed. Use a router fitted with the V cutter and make the bevel cut about 1/16 × 1/16 inch. This bevel will allow the

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Fig. 8-14. A simple jig is used to drill the diagonal pilot holes for the screws. Make it from available scrap wood.

edge of the leatherette to be protected. It also gives the appearance that the surface below is padded. Assemble with dowels.

Add the ends and sides, then shape the edge with the router fitted with a suitable cutter.

Again using the drilling jig, make the necessary pilot holes for mounting the top.

The drawer is easily made using a double front. The face piece matches the apron; sides, front, and rear are ½-inch plywood and the bottom is ¼-inch plywood. Make rabbet cuts for the rear and bottom section. Drill clearance holes for the pull screws in the front inner panel. Assemble the drawer with glue and 1½-inch finishing nails.

The leatherette panels are cut to size but are not installed until the table has been stained and lacquered. If spraying equipment is used, mask off both the panel and checkerboard areas. Masking can best be done with kraft paper and masking tape. If you use a brush, you can eliminate the kraft masking over the checkerboard area—however, the edges should be taped anyway to prevent color from running into clear areas.

After color finish is completed, remove masking from chessboard area and apply clear lacquer or varnish over the entire table. When dry, remove the mask from the panel area and cement the leatherette. Spray adhesive works best for this. Apply to leatherette and when the adhesive becomes tacky, apply leatherette to the table surface. Work the edges into the beveled edges.

This completes the table. Add the hardware and get out the chessmen.

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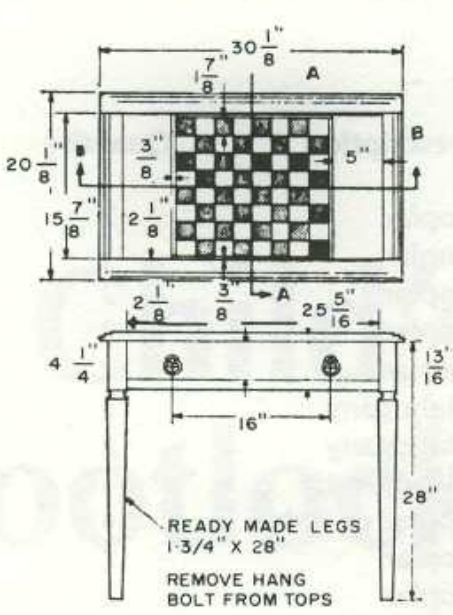

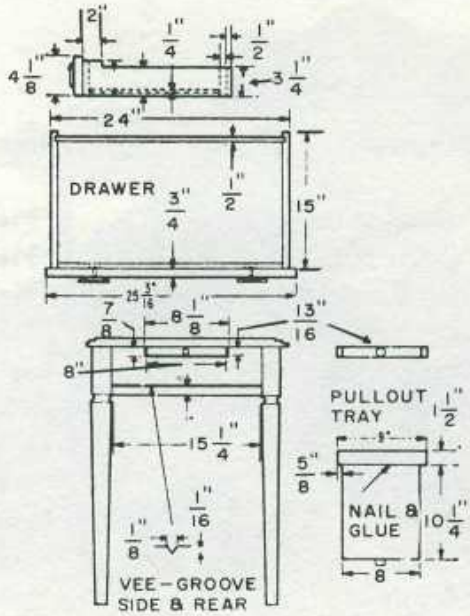

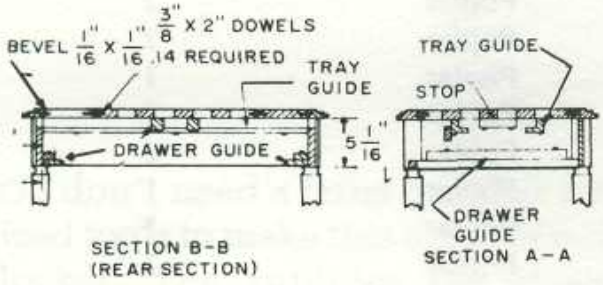

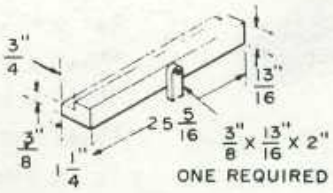

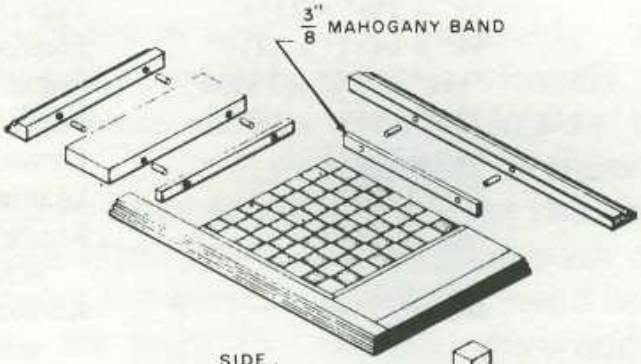

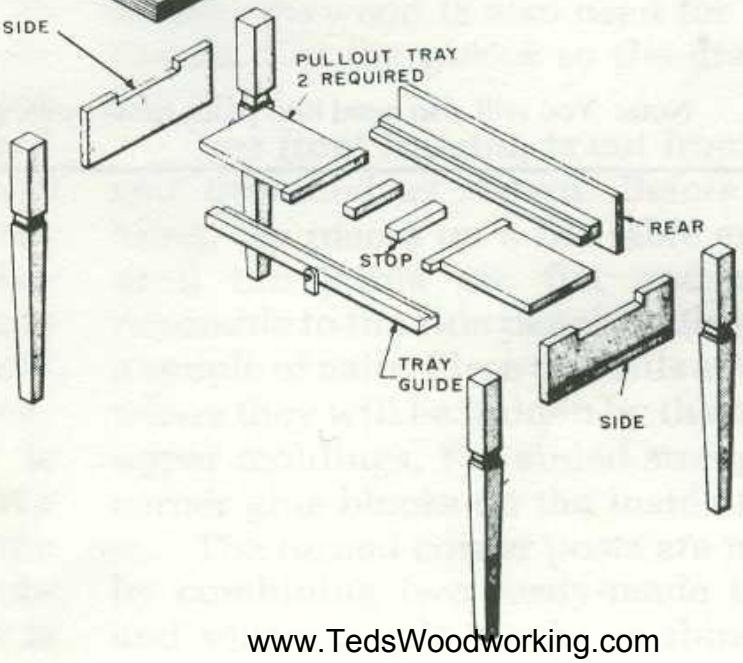

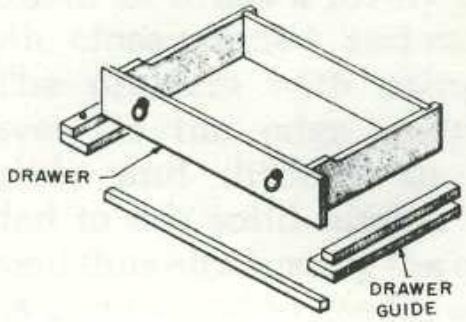

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MATERIALS LIST

Purpose	Size	Description	Quantity
Apron sides	13/16" × 5 1/16" × 15 1/4"	Poplar	2
Apron rear	13/16" × 5 1/16" × 25 5/16"	Poplar	1
Top front and rear ends	13/16" × 2 1/8" × 30 1/8"	Poplar	2
Top side ends	13/16" × 2 1/8" × 15 3/4"	Poplar	2
Top panel	3/16" × 5" × 15 3/4"	Poplar	2
Band end	3/8" × 13/16" × 15"	Mahogany	2
Band end	3/8" × 13/16" × 15 3/4"	Mahogany	2
Strip	13/16" × 1 7/8" × 15"	Mahogany	4
Strip	13/16" × 1 7/8" × 15"	Poplar or Ash	4
Tray	13/16" × 8" × 10 1/4"	Poplar	2
Tray rear	13/16" × 1 1/2" × 9"	Poplar	2
Tray guide	13/16" × 1 1/4" × 25 5/16"	Poplar	2
Tray stop	13/16" × 1 1/8" × 8"	Poplar	2
Drawer stop	3/8" × 13/16" × 2"	Poplar	1
Drawer runner	13/16" × 1 3/4" × 14 1/4"	Poplar	2
Drawer guide	13/16" × 1 1/8" × 14 1/4"	Poplar	2
Drawer front	13/16" × 4 1/8" × 25 3/16"	Poplar	1
Drawer subfront	1/2" × 3 3/4" × 23"	Poplar	1
Drawer sides	1/2" × 3 3/4" × 15"	Poplar	2
Drawer rear	1/2" × 2 3/4" × 23 1/2"	Poplar	1
Drawer bottom	1/4" × 14 3/4" × 23 1/2"	Plywood	1
Drawer support	13/16" × 2 3/4" × 25 5/16"	Poplar	1
Legs	1 3/4" × 1 3/4" × 28"	Poplar	4
	3/8" × 2"	Dowels	12
Panels	5" × 15 3/4"	Leatherette	2
	No. 8 1 1/2"	Round-head screws	as needed
	No. 8 2 1/2"	Round-head screws	as needed

Note: You will also need lion pulls, brass pulls, glue, spray adhesive, stain and lacquer.

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Child's Footlocker

YOU don't need a lathe or other specialized tools to make this attractive child's footlocker. The spindles are assembled from stock items and, except for a few scroll cuts made with a saber saw, every bit of the construction can be done with ordinary hand tools.

The combination of solid lumber and plywood used in construction eliminates the problems that often confront the home craftsman. Wide flat boards are hard to come by in solid lumber except perhaps for knotty pine which is not suitable in this case. Our solution was to use plywood which is available in many types of wood and in several thicknesses. Birch was selected for the child's footlocker illustrated as it has a lovely grain and is smooth, close grained, and easy to finish.

The problem with using plywood, however, is the edge grain which is unsightly and difficult to finish. We decided to use solid lumber to edge the plywood thus eliminating the second problem. A good wood to use for edge work is poplar. It, too, has an excellent grain pattern, is close-grained and is easy to work.

Assembly is accomplished with screws, dowels, nails and glue. Cut all sections to size, check for proper fit, then assemble as shown in the photographs. The edging for the seat section is mitered and assembled with dowel pins. If you cut the miters by hand be sure they are straight and square. Plywood is also used for the end panels. Cut the pieces so the grain runs vertically.

The front framing is cut from poplar and dowelled as shown. Before assembling, lay pieces on a flat table and sand until the joints are flat and smooth. Assemble to the side panels with glue and a couple of nails. Place the nails at the ends where they will be hidden by the base and upper moldings. For added strength, use corner glue blocks on the inside corners.

The turned corner posts are made up by combining two ready-made turnings and square maple blocks as shown. The

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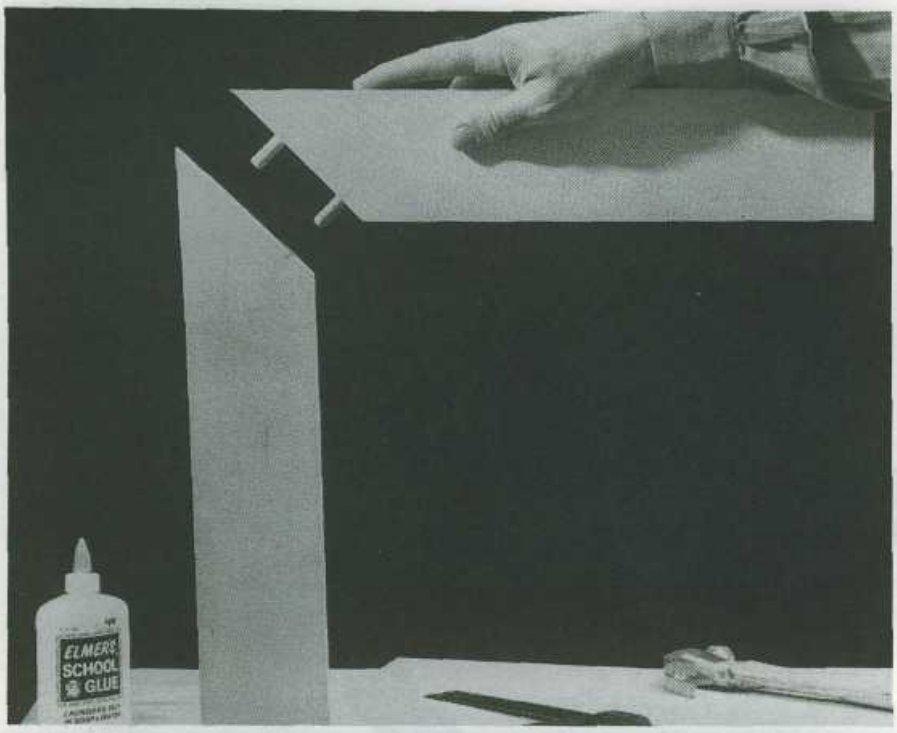

Fig. 9-1. The frame of the footlocker seat is cut from ¾-inch poplar. First miter the corners, then assemble with the aid of both dowels and glue, as pictured in this photograph.

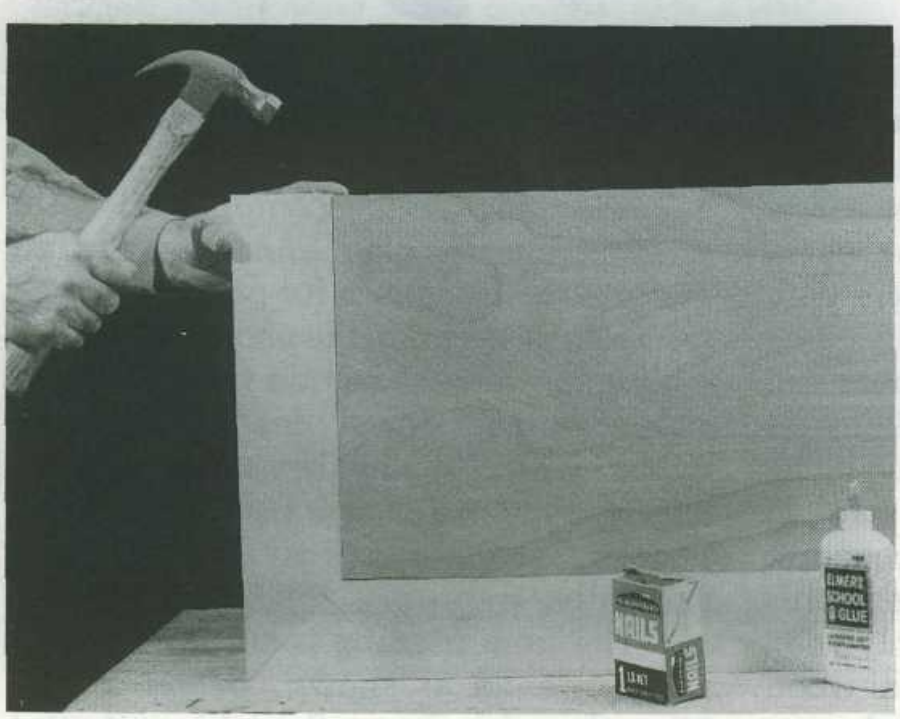

Fig. 9-2. As shown here, nails and dowels are used to attach the poplar frame to the birch plywood seat. If they are readily available, clamps will prove to be very helpful, also.

squares are cut from a length of maple base block. The ends are rounded by using a file and following up with sandpaper. Assemble with dowels and white glue. Ordinary dowels may be used, but grooved dowel pins are best as they will retain the glue better.

The spindles for the seat back and arm rests are also stock items. For the arm rests, the spindles are cut in half. The cut end of the spindles will have to be whittled so they will fit the holes drilled into the seat. Refer to the drawing.

The drawers are made of ½-inch lumber with ¼-inch plywood bottoms. Three-quarter-inch false fronts are added to the drawers. This greatly simplifies construction and eliminates the need for

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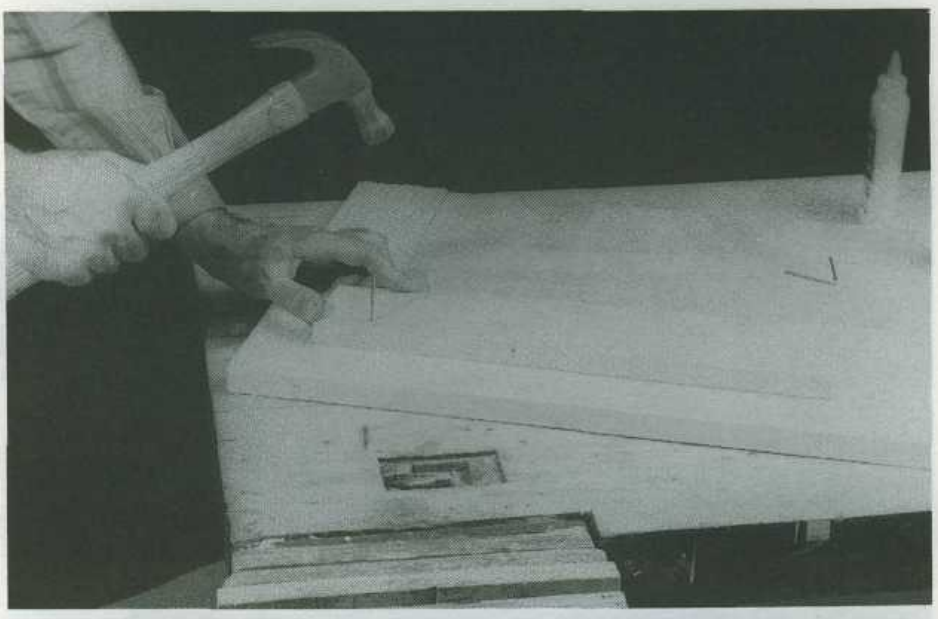

Fig. 9-3. The cleats are attached to the underside of the footlocker seat with the aid of both nails and glue. Note the dimensions for same as listed in the adjacent Materials List.

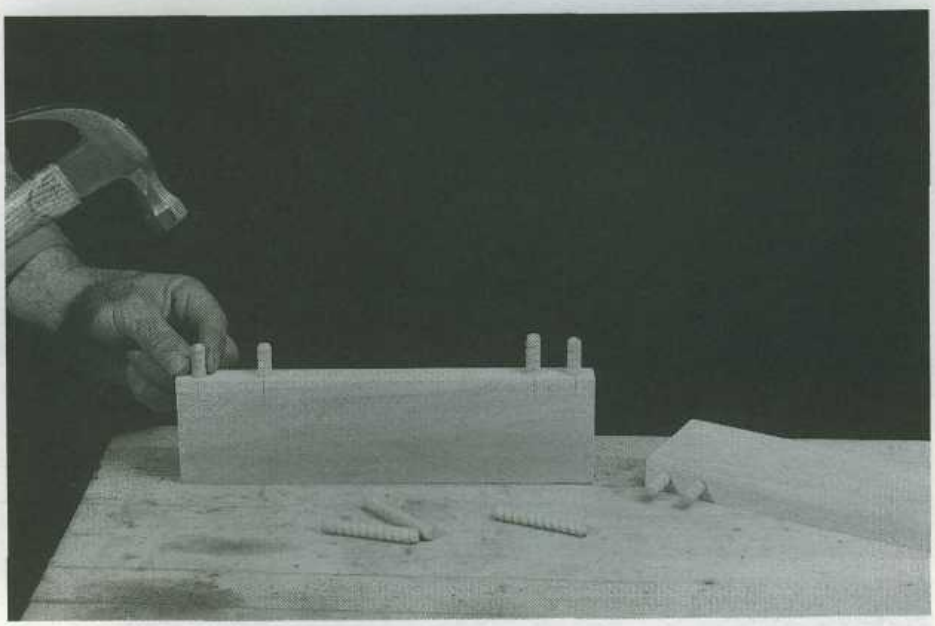

Fig. 9-4. The poplar front framing is doweled as pictured here. Before beginning the assembly, lay all the pieces on a flat table and sand the joints until they are flat and smooth.

shaping and undercutting. Single track drawer hardware is recommended. The type used here was Knape-Vogt No. 1175.

The base is cut to shape then assembled by means of screws from the inside. Likewise, the seat is assembled to the side, rear and front by means of cleats and round-head screws.

After assembly, sand smooth then stain and finish as desired.

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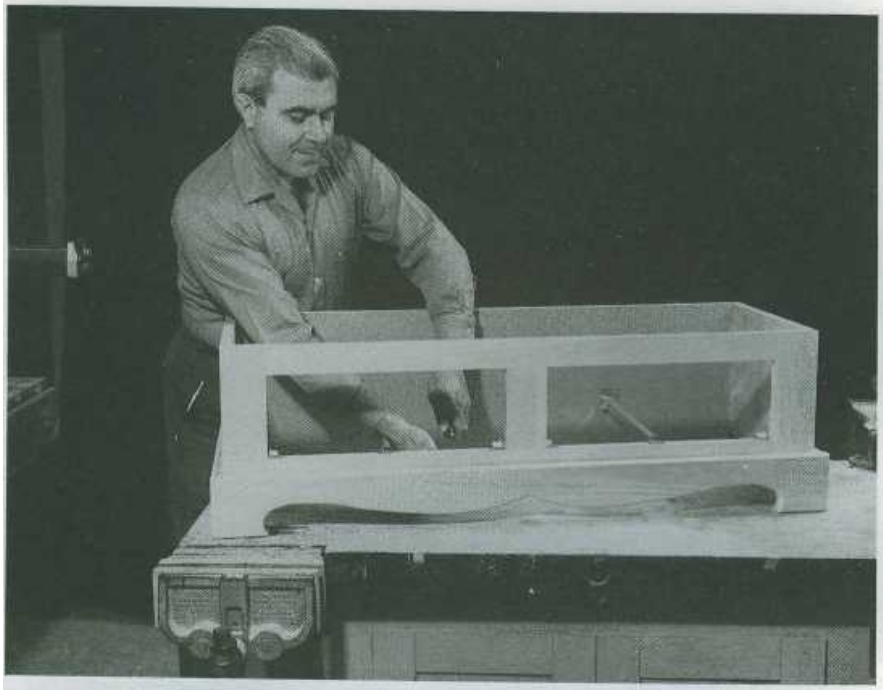

Fig. 9-5. The base section is fastened to the main section with the aid of screws. Note the single track drawer slide hardware. Knape-Vogt No. 1175 was selected for use in this project.

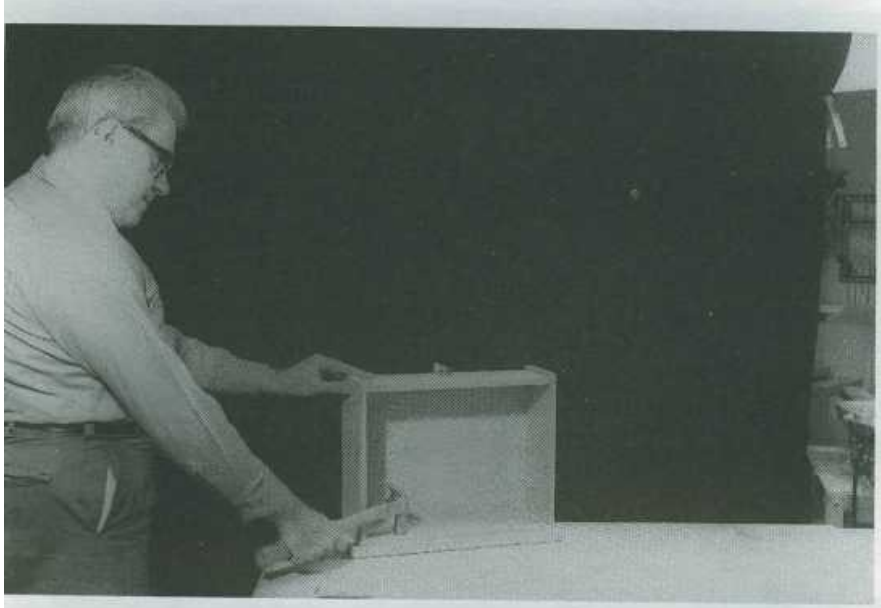

Fig. 9-6. Drawer construction is greatly simplified by the use of false fronts which also eliminate need for shaping, undercutting. Drawer's completed first, then false front added.

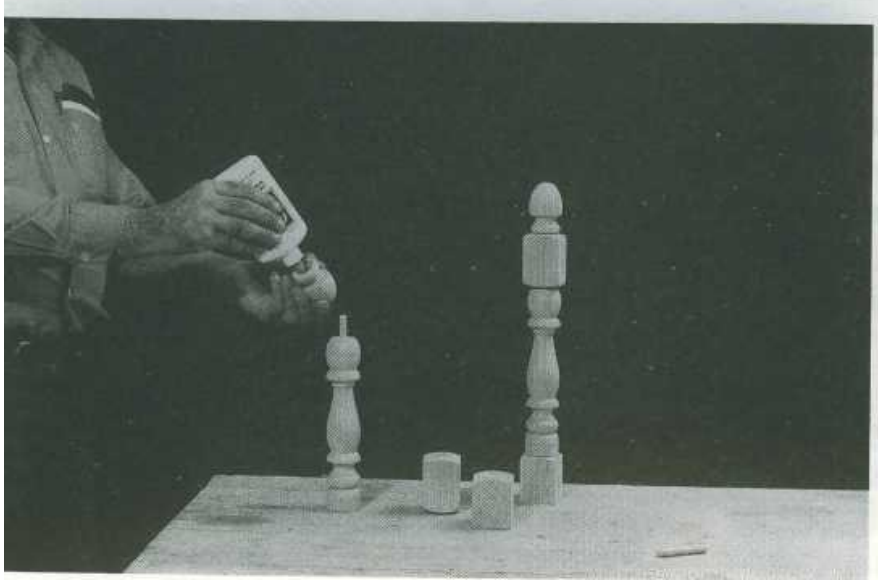

Fig. 9-7. No lathe is needed—corner posts are made up by combining two ready-made turnings with square maple blocks. Ends are rounded by a file, sandpaper.

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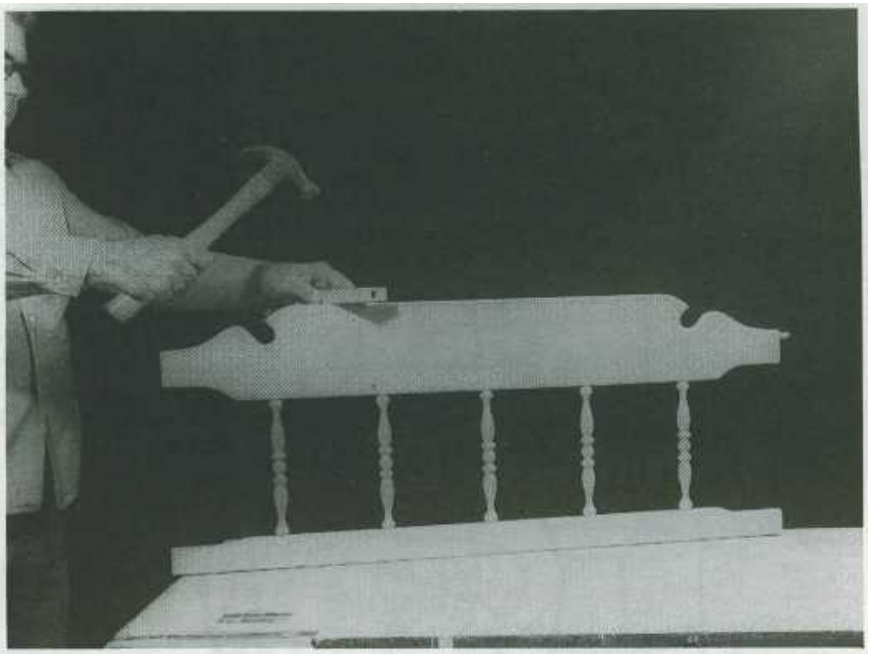

Fig. 9-8. The back piece is drilled to accept the spindles. The scrap under the hammer serves to prevent any damage. Seat back and arm rest spindles are both stock items.

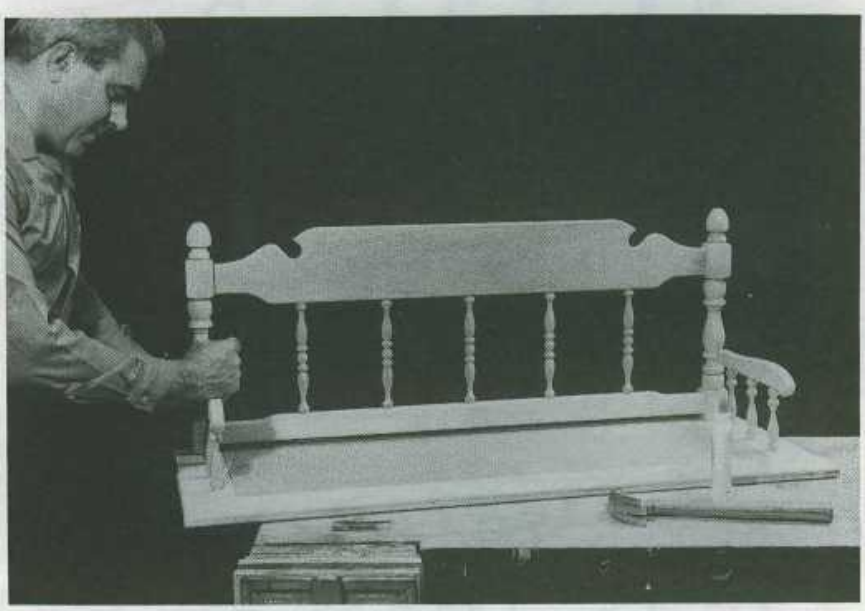

Fig. 9-9. For the two poplar arm rests, the 5 7/16-inch-long side spindles are cut in half. You will have to whittle their cut ends so as to fit the holes drilled into the seat, as shown here. For further information, refer to the drawing.

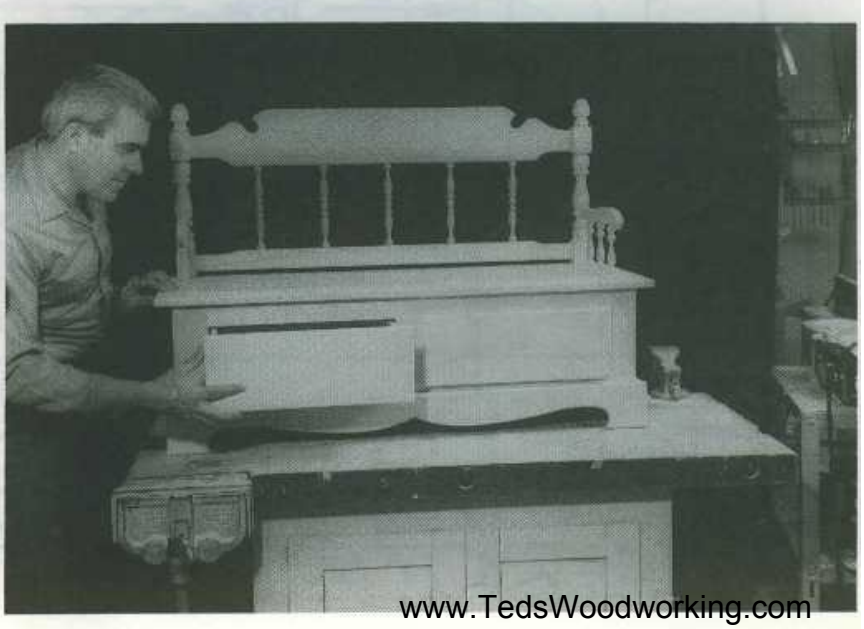

Fig. 9-10. The drawers are made of ½-inch lumber with ¼-inch plywood bottoms and must be made with the proper allowance for the drawer hardware that is to be used. Therefore, you should obtain the necessary hardware before you actually make the drawers.

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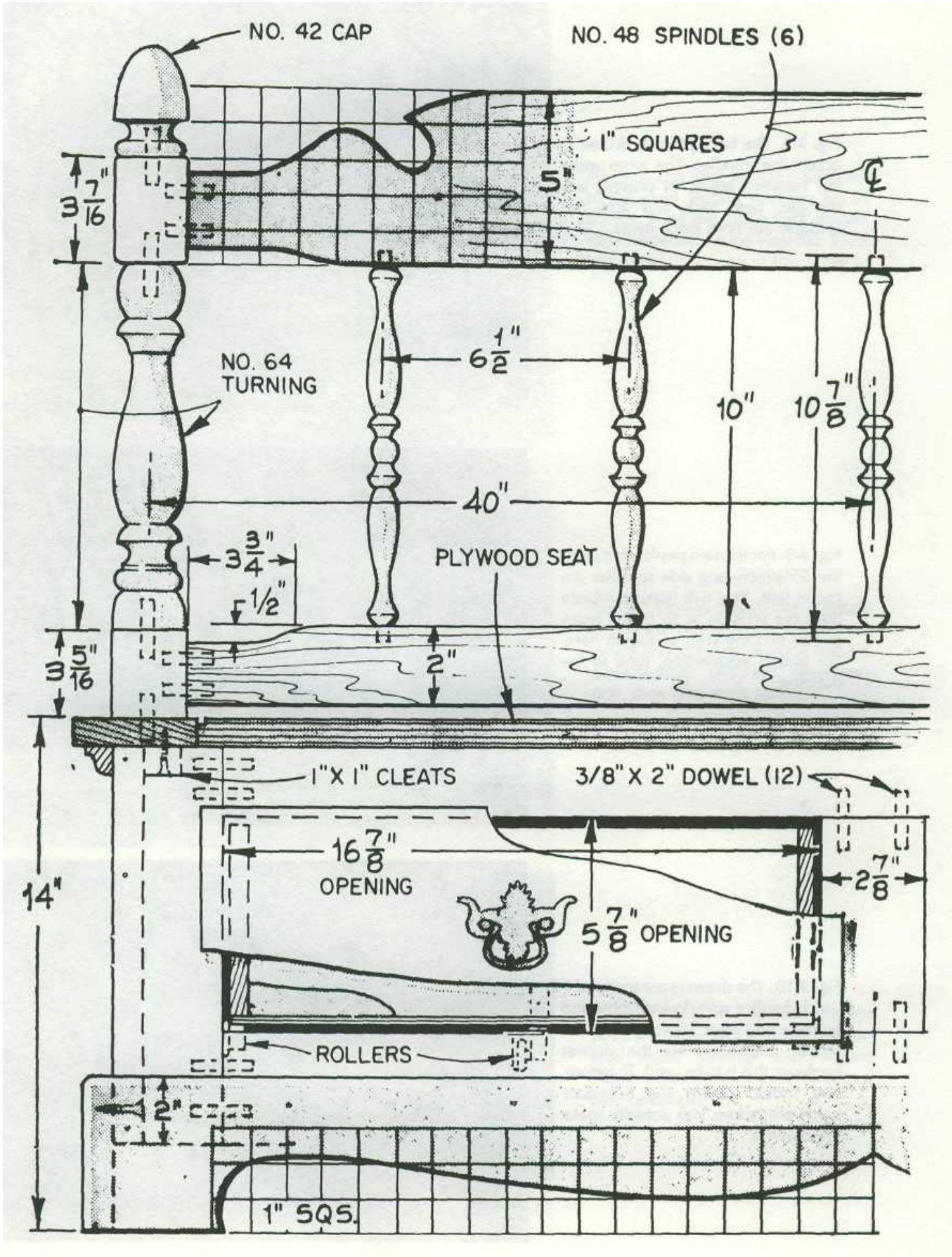

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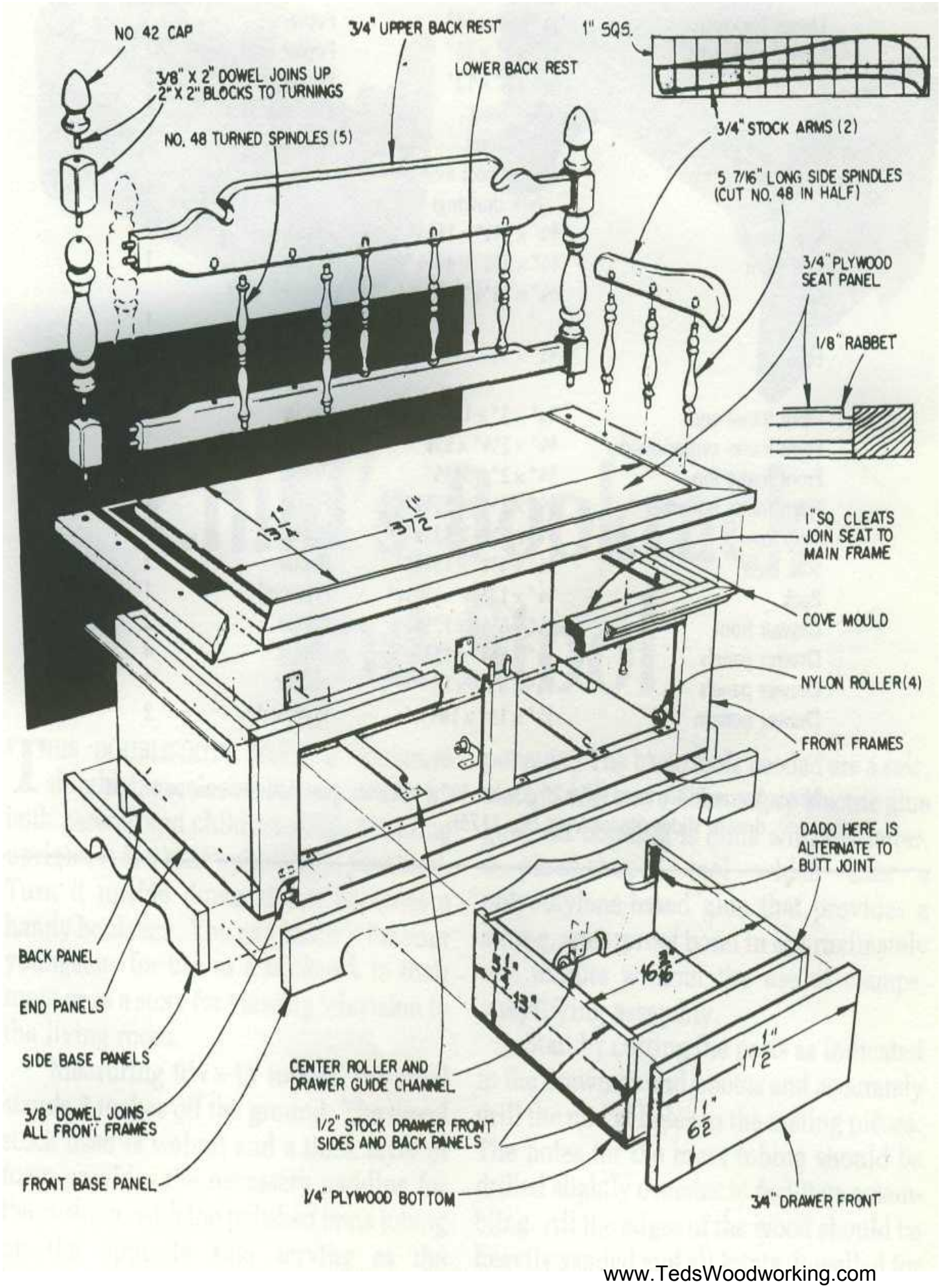

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MATERIALS LIST

Purpose	Size	Description	Quantity
Upper backrest	¾″ × 5″ × 38″	Poplar	1
Lower backrest	¾″ × 2″ × 38″	Poplar	1
Armrests	¾″ × 2″ × 12″	Poplar	2
	5 7/16″ long	Side spindles	6
	10⅞″ long	Rear spindles	5
	Corner post assembly (see drawing)		2
Seat sides	¾″ × 3½″ × 16¾″	Poplar	2
Seat front	¾″ × 3½″ × 44½″	Poplar	1
Seat	¾″ × 13¼″ × 37½″	Lumber core birch	1
Ends	¾″ × 11″ × 15″	Lumber core birch	2
Front frame ends	¾″ × 3″ × 11″	Poplar	2
Front frame center divider	¾″ × 2⅞″ × 5⅞″	Poplar	1
Front frame top	¾″ × 2″ × 35¾″	Poplar	1
Front frame bottom	¾″ × 3⅛″ × 35¾″	Poplar	1
Front base	¾″ × 4¼″ × 43¼″	Poplar	1
Side base	¾″ × 4¼″ × 15¾″	Poplar	2
Back	¾″ × 13 3/16″ × 40¼″	Plywood	1
Drawer front	¾″ × 6½″ × 17¼″	Poplar	2
Drawer panels	½″ × 5¼″ × 15 3/16″	Poplar	4
Drawer panels	½″ × 5¼″ × 13″	Poplar	4
Drawer bottom	¼″ × 13″ × 16 3/16″	Plywood	2

Note: You will also need ⅜″ × 2″ dowels, ¾″ × 1″ cleats, glue, nails, screws, pulls, and drawer slides (Knape-Vogt No. 1175).

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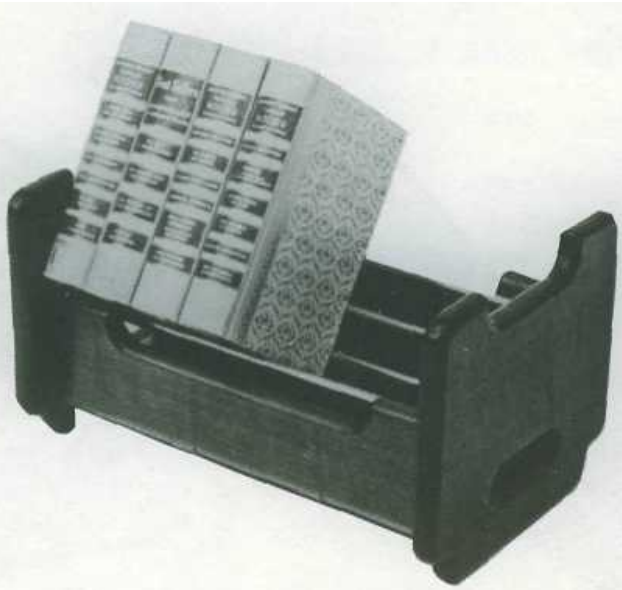

Child's Bookrack and Stool

THIS DOUBLE-DUTY PIECE of furniture should be welcome in any home by both parents and children alike. Standing upright, it is a neat upholstered footstool. Turn it upside down and it becomes a handy bookrack. You can build it for your youngsters for use as a bookrack in their room or as a stool for viewing television in the living-room.

Measuring 9⅜ × 13 inches, the stool stands 8 inches off the ground. The wood stock used is walnut and a thick layer of foam provides the necessary padding for the cushion, with the polished brass tubing on the opposite side serving as the bookrest. Construction is very easy, with all the dimensions shown on the plans. (See materials list for size of all components.) The basic tools needed are a saw, electric drill and a Thermogrip electric glue gun. All bonding is done with the latter, a pistol-shaped tool which uses a polyethylene-based glue that provides a strong, waterproof bond in approximately one minute without the use of clamps, simplifying assembly.

Start by cutting the parts as indicated in the drawings and photos and accurately drill the dowel holes in the mating pieces. The holes for the brass tubing should be drilled slightly oversize to facilitate assembling. All the edges of the wood should be heavily sanded and all joints dowelled for added strength and rigidity. Next bond with the Thermogrip gun. There is no need to wait while the glue sets—just apply glue,

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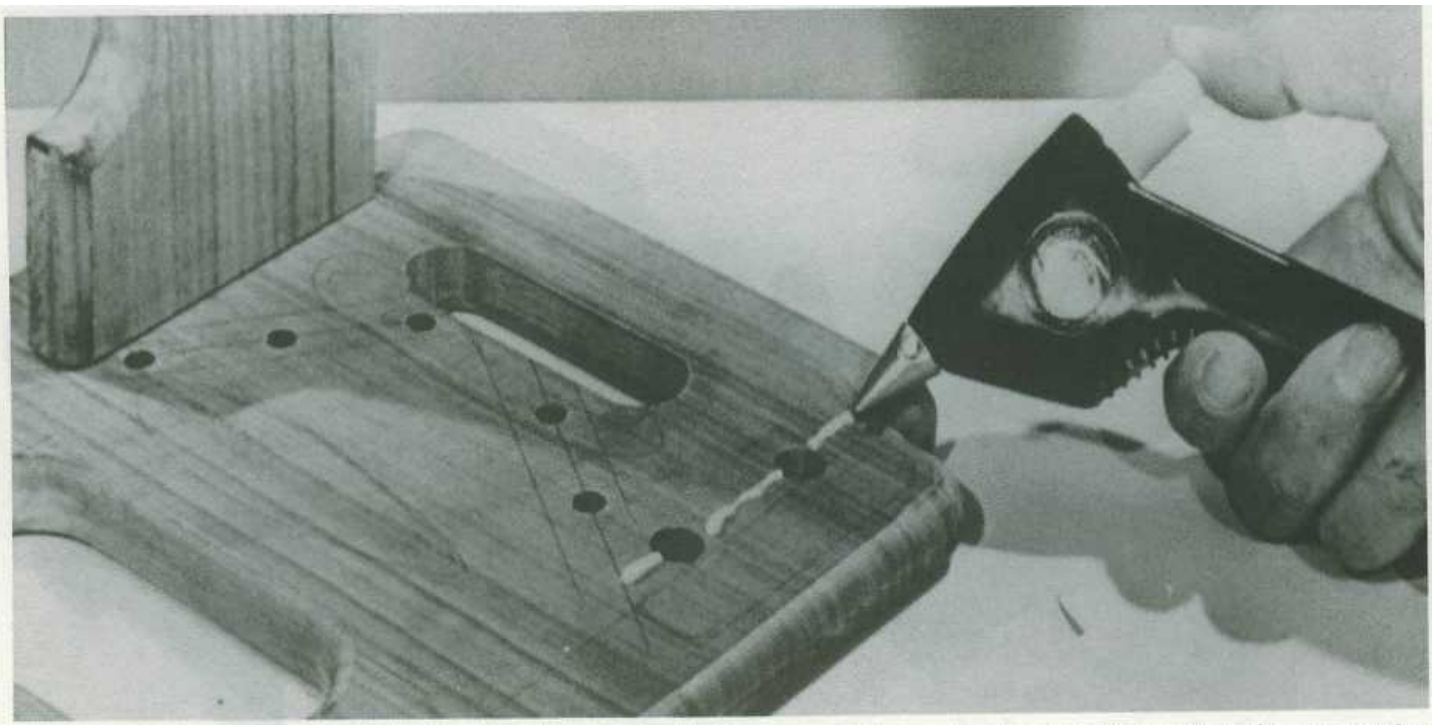
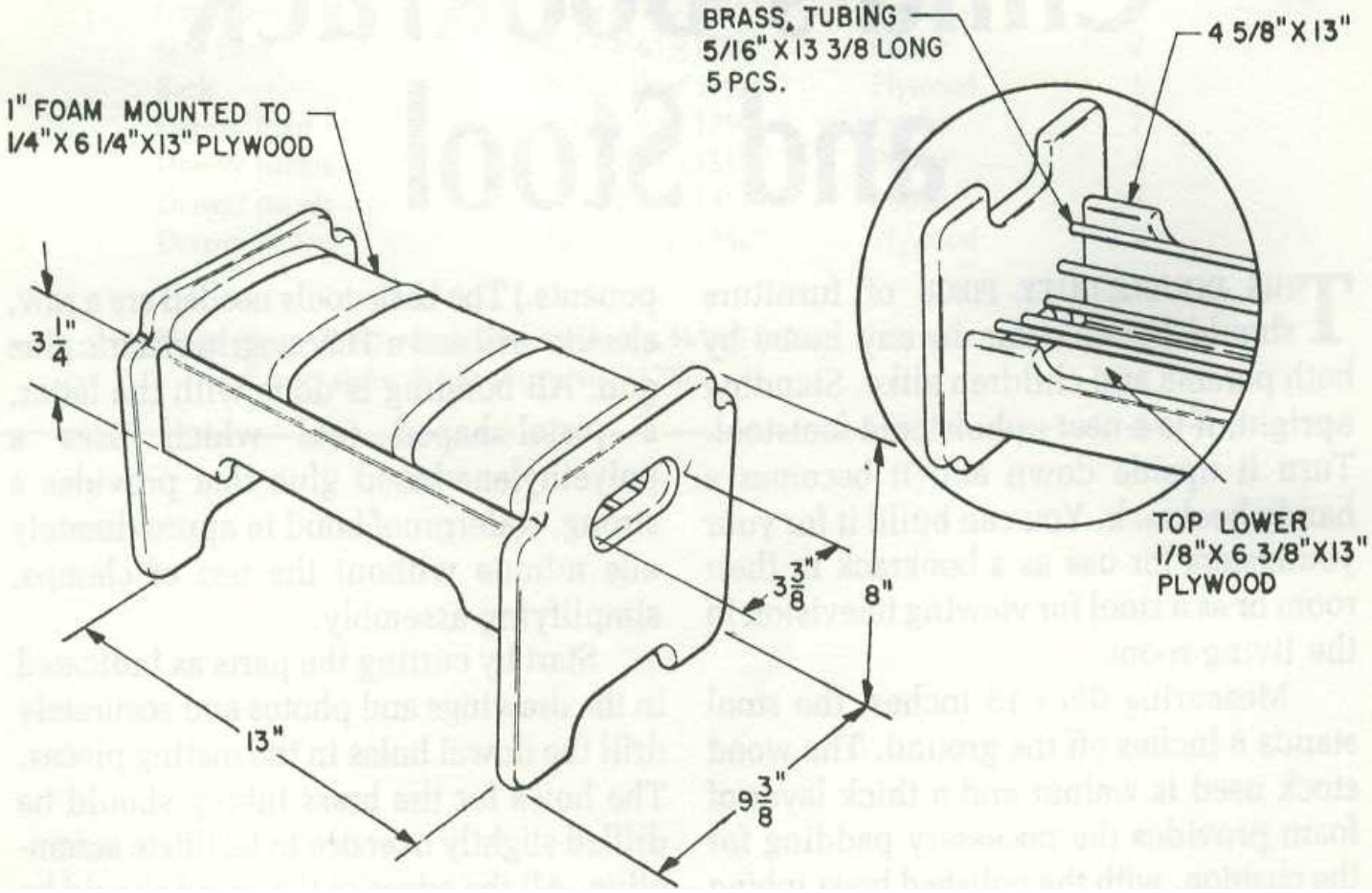


Fig. 10-1. A thin line of hot-melt glue from the Thermogrip electric gun provides an effective bonding agent in the construction of the combination bookrack-stool. The glue dries in approximately 60 seconds.



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MATERIALS LIST

Purpose	Size	Description	Quantity
Ends	8″ × 9⅜″	Walnut	2
Front	3¼″ × 13″		
Rear	4⅝″ × 13″		
Top upper	¼″ × 6¼″ × 13″	Plywood	
Top lower	⅛″ × 6⅜″ × 13″	Plywood	
Brass tubing	5/16″ × 13⅜″	1-inch foam	5
	½″ dia.	Dowel rod	
		Cushion cover material	

press the parts together for twenty seconds and the project is completed.

If you have a router or shaper available, break all the corners with a quarter round cutter. Otherwise, sand first with a coarse paper, then fine and finally an extra fine grade. Use a paste wood filler to seal the pores. For finishing use a thin wash coat of shellac; apply coat of shellac or varnish.

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Colonial Desk with Bookrack

THIS ATTRACTIVE DESK will enhance any room in your home. The single pedestal is an offshoot of the more common double pedestal, which was very popular in colonial days. It has four roomy drawers, with the largest one at the bottom made to hold letter-size folders. The pedestal support serves as a bookrack to hold a good supply of reading materials.

As shown in the drawing, cleats are used extensively. They greatly simplify construction and assembly, as well as eliminate the need to drive nails or screws through the top surface of the desk. Some nails are driven through the side members, but they can be replaced with nails or screws driven from the inside of the cabinet.

The pedestal and bookrack are cut from 1⅛-inch white pine. We used common lumber because it costs about one-half as much as clear. Colonial furniture should have knots, but by carefully selecting your lumber you can eliminate the really bad ones.

You will note that fake tenons are used on the bookshelf members. The final effect looks like the real thing, but the fake method shown is easier and perhaps a little stronger.

The tools required for this project are a table saw, saber saw, router, and drill. In addition, you will need the usual hand tools, such as a hammer, screwdriver, and wrench.

Select flat boards for the top and sides. Cut the pieces to size and shape the bottom edges as shown in the drawing. After cutting the scallop design, use a router with a rounding-off cutter to round off the outside face of the cut. Do not rout the inside face.

Place the top board face down onto a flat surface. (The top of a table saw is ideal because it is exceptionally flat.) Next cut and install the cleats as indicated, using glue and 1¼-inch brads. Rabbet the rear cleats to accept the ¼-inch back panel. Make the rabbet either on the table saw or with the router. Note that the front cleat is

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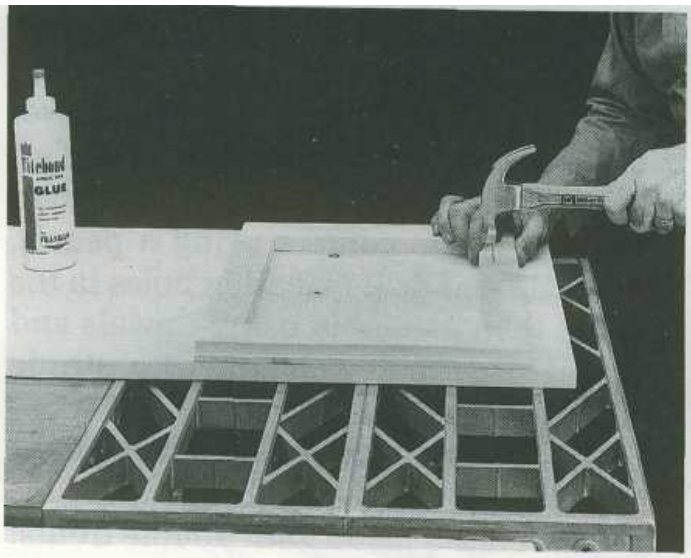

Fig. 11-1. In assembling the colonial desk, cleats are used extensively as in most fine furniture construction. Attach with glue and nails.

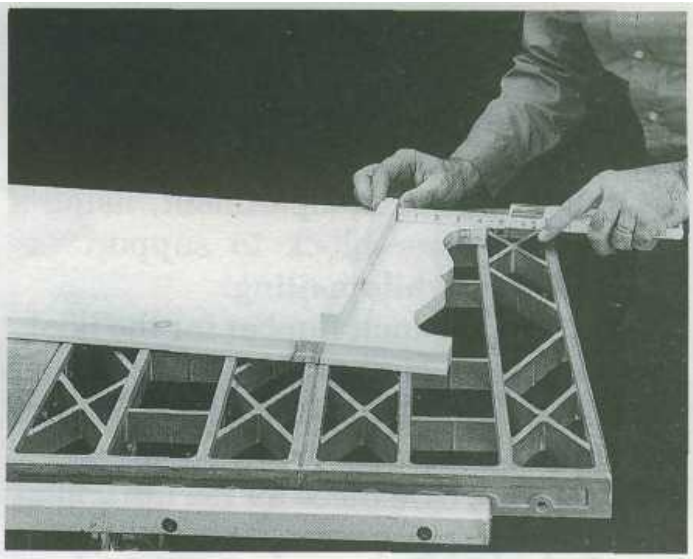

Fig. 11-2. An exception is a temporary cleat in the base of the cabinet. Attach it with nails only. Remove it when you install the bottom panel.

Fig. 11-3. Installing the bottom board. Note the two blocks that are aids to positioning. Remove them after you have nailed the bottom board in the proper position.

Fig. 11-4. Use lag screws to join shaped pedestal and base sections, as well as the top section to the pedestal. Use washers under screw heads.

1 inch in from the front. Side cleats are 1¾ inch from the edge.

Next, prepare the side panels. Rabbet the rear edge of both, but note that the left upright is rabbeted at two places near the top. The smaller rabbet is to accept the rear panel of the wide drawer compartment.

To ensure proper alignment in assembly, make up a couple of temporary cleats. At this time also cut the bottom panel for the drawer compartment. Install the temporary cleats so that the bottom panel rests on them as shown. Glue up the section and nail it in place, using a square

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to make sure the sections are perpendicular. If necessary, nail a diagonal to hold the sections while the glue sets. Add the drawer compartment cleats and install the single drawer compartment, using a temporary spacer block to support the bottom board while nailing.

Cut the 1⅛-inch lumber for the bookrack section to size and round the edges with the router. This time round both sides to obtain a half-round effect.

Make the base piece for the upright by gluing up two pieces of ¾-inch stock. After shaping, assemble to the upright with two 3-inch lag screws.

To align the shelves, drill the dowel holes in the end piece and place it right up to the center upright. Center it and then transfer the hole centers using a pencil. Next locate and drill matching holes in the shelves, then assemble using dowels and screws. Drive the dowels so they protrude ½ inch from the outside.

Make up two fake tenons and assemble with glue.

Drawers are made with double fronts.

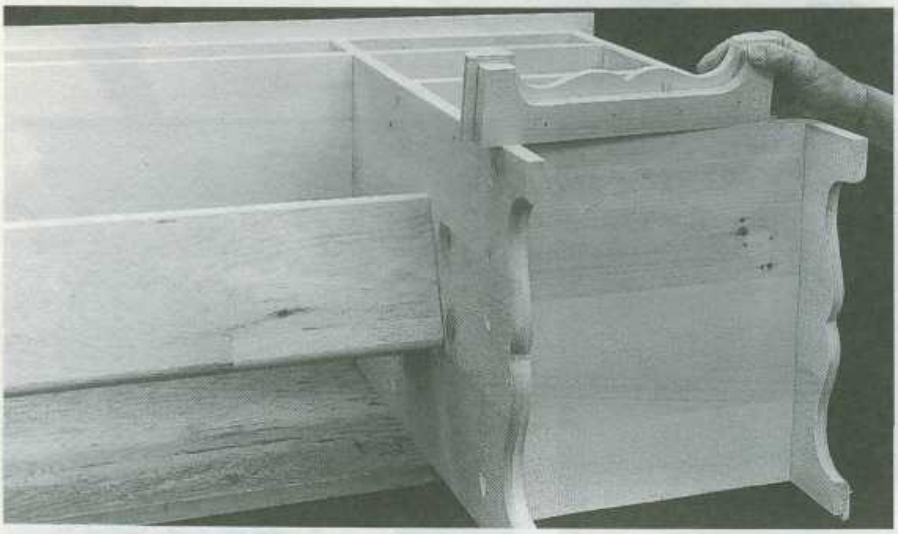

Fig. 11-5. Attaching the scalloped base to the backup board at the front of the desk. Glue with nails only at the sides.

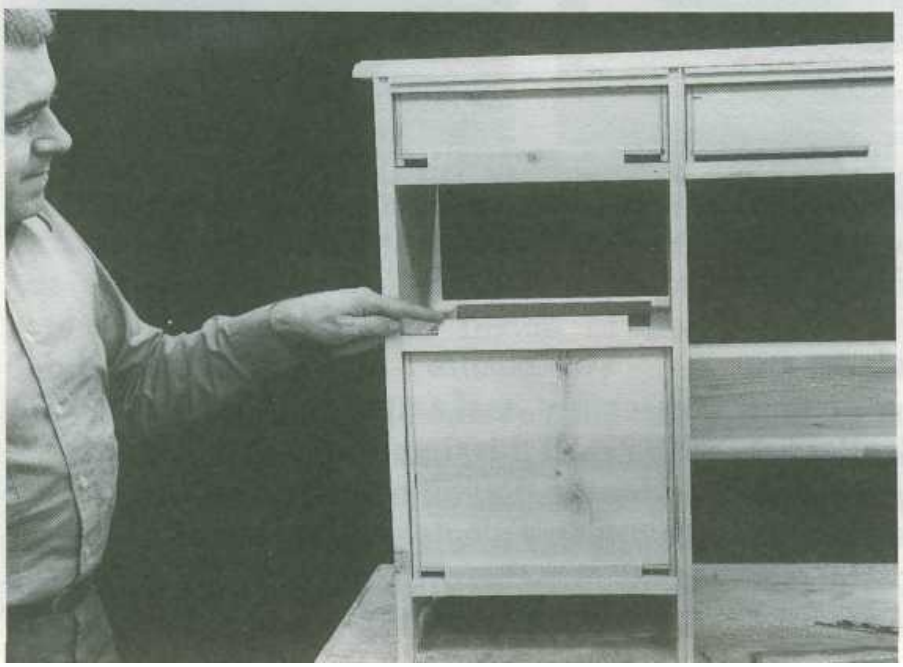

Fig. 11-6. Nail and glue the drawer stops to the rear of each compartment. Place them so the drawer fronts protrude ⅜ inch.

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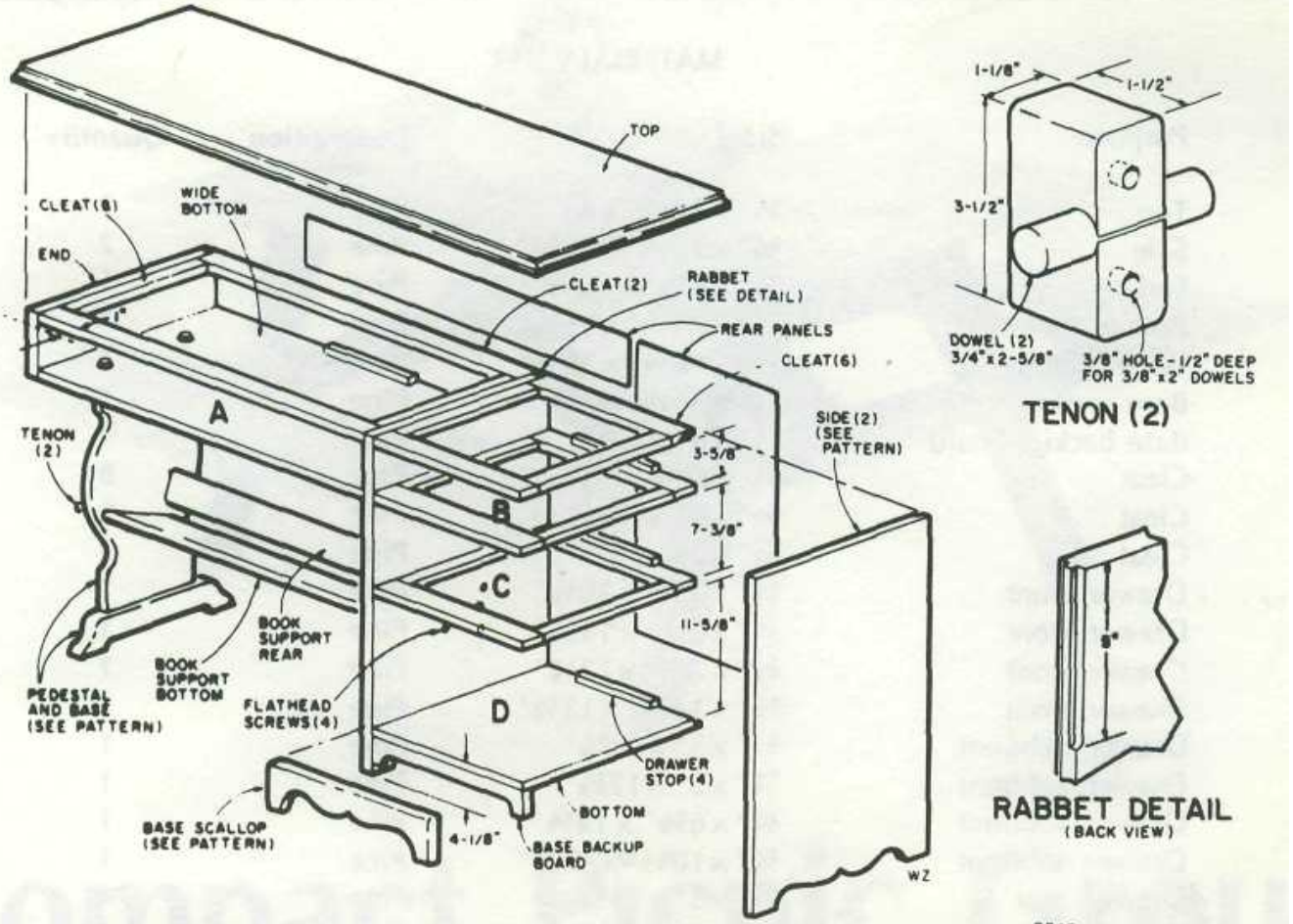
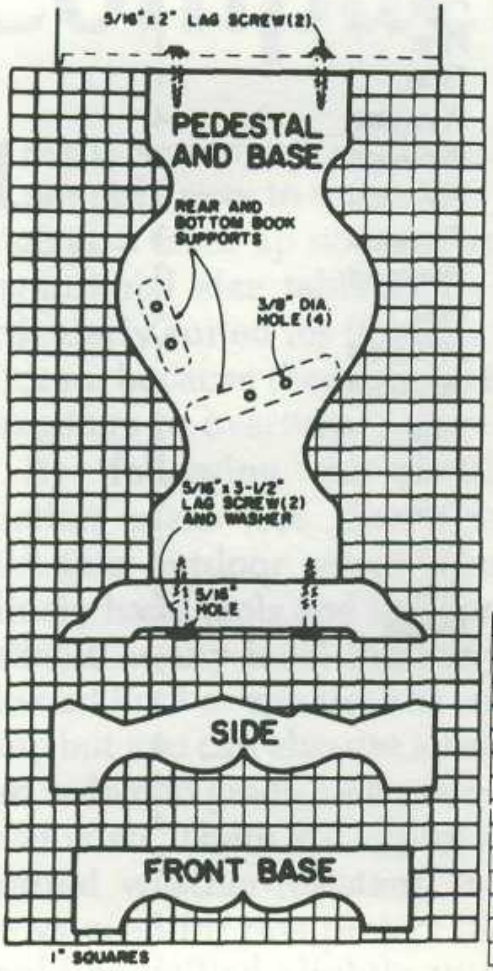
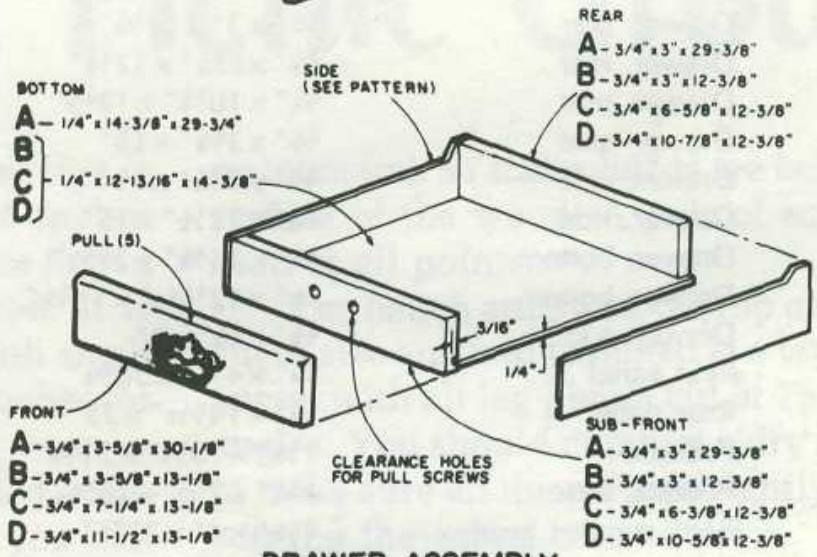


TENON (2)

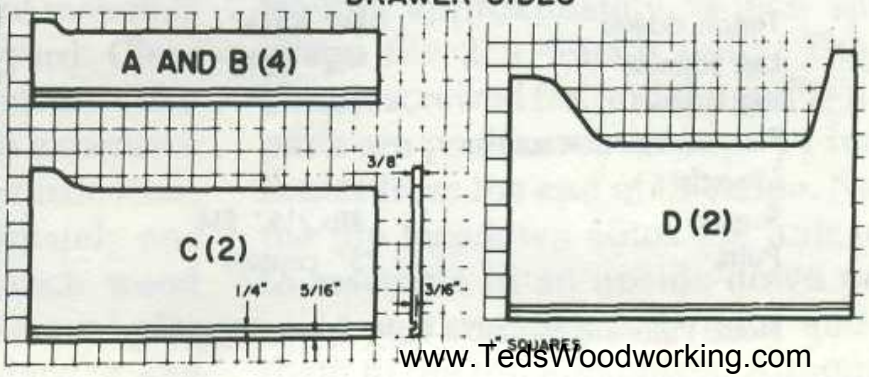
RABBET DETAIL
(BACK VIEW)





DRAWER ASSEMBLY

DRAWER SIDES



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MATERIALS LIST

Purpose	Size	Description	Quantity
Top	¾" × 17¼" × 48"	Pine	1
Side	¾" × 16⅛" × 29¼"	Pine	2
End	¾" × 5¼" × 16⅛"	Pine	1
Bottom	¾" × 13¼" × 16⅛"	Pine	1
Wide bottom	¾" × 16⅛" × 30¾"	Pine	1
Base scallop	¾" × 3½" × 14¼"	Pine	1
Base backup board	¾" × 3" × 13¼"	Pine	1
Cleat	¾" × 1" × 11⅞"	Pine	8
Cleat	¾" × 2" × 13¼"	Pine	6
Cleat	¾" × 2" × 30¼"	Pine	2
Drawer, front	¾" × 3⅝" × 30⅛"	Pine	1
Drawer, front	¾" × 3⅝" × 13⅛"	Pine	1
Drawer, front	¾" × 7¼" × 13⅛"	Pine	1
Drawer, front	¾" × 11½" × 13⅛"	Pine	1
Drawer, subfront	¾" × 3" × 29⅜"	Pine	1
Drawer, subfront	¾" × 3" × 12⅜"	Pine	1
Drawer, subfront	¾" × 6⅜" × 12⅜"	Pine	1
Drawer, subfront	¾" × 10⅝" × 12⅜"	Pine	1
Drawer, rear	¾" × 3" × 29⅜"	Pine	1
Drawer, rear	¾" × 3" × 12⅜"	Pine	1
Drawer, rear	¾" × 6⅝" × 12⅜"	Pine	1
Drawer, rear	¾" × 10⅞" × 12⅜"	Pine	1
Drawer, side	⅜" × 3⅝" × 15"	Plywood	4
Drawer, side	⅜" × 7¼" × 15"	Plywood	2
Drawer, side	⅜" × 11½" × 15"	Plywood	2
Drawer, bottom	¼" × 14⅜" × 29¾"	Plywood	1
Drawer, bottom	¼" × 12 13/16" × 14⅜"	Plywood	3
Drawer stop	⅜" × ¾" × 8"	Pine	4
Rear panel	¼" × 4½" × 30¾"	Plywood	1
Rear panel	¼" × 14 3/16" × 25"	Plywood	1
Pedestal	1⅛" × 10¾" × 21⅝"	Pine	1
Pedestal base	1¾" × 2½" × 15 7/16"	Pine	1
Book support, rear	1⅛" × 4" × 27⅜"	Pine	1
Book support, bottom	1⅛" × 6¾" × 27⅜"	Pine	1
Tenon	1⅛" × 1½" × 3½"	Pine	2
Tenon dowel	¾" × 2⅝"	Maple	2
Lag screws	5/16" × 3½"		2
Lag screws	5/16" × 2"		2
Flat washers for screws			4
Dowels	⅜" × 2"		4
Screws	#8x2½" FH		4
Pulls	3" centers		5

Note: Pulls are available from Armor Products.

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Compact Picnic Group

HERE IS A compact picnic group that is not only easy to move and set up, but which also takes up no more space than a conventional size table of its type. It is particularly suited for families with small children, because there are no benches for youngsters to overturn.

By following the simplified construction plans (see drawings) you can build this outdoor set of furniture with ordinary hand tools and standard materials available at any local lumber yard. Clear redwood lumber was used to construct this group but you can also use a less expensive heart redwood grade for a more rustic look, if you wish. There are approximately one hundred weather-resistant, 3-inch wood screws used for this project. Screw holes should be drilled slightly undersize and countersunk so screw heads are below the surface of the wood. A pair of screws is used at all points.

The bench arms and the top cleats are cut to size and end trimmed at a 60-degree angle, with all leg pieces cut at 75-degree angles. You should conduct a dry run test to make sure all the parts fit tightly before starting the actual construction.

Begin by assembling the tabletop, leaving approximately ⅜-inch space between the 2- × -6-inch units. The center cleat is screwed flat and the end 2- × -4-inch parts are positioned on edge 14 inches on center from the end of the table. Next turn the top facedown since the unit is easier to assemble in an upside-down position.

Construct the leg units and attach them to the top and cleats. Although easy

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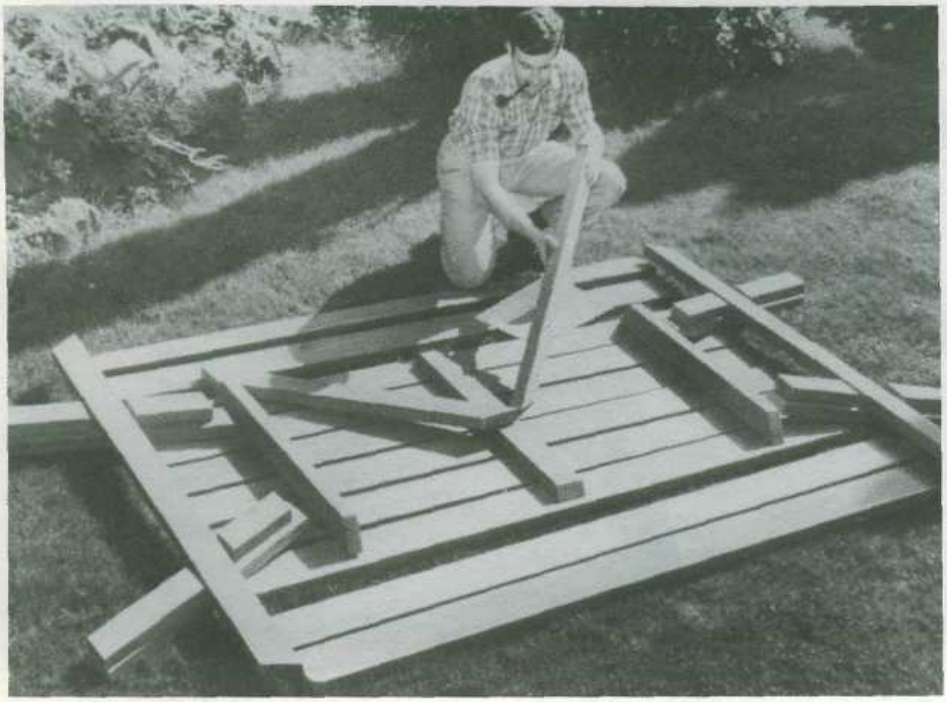
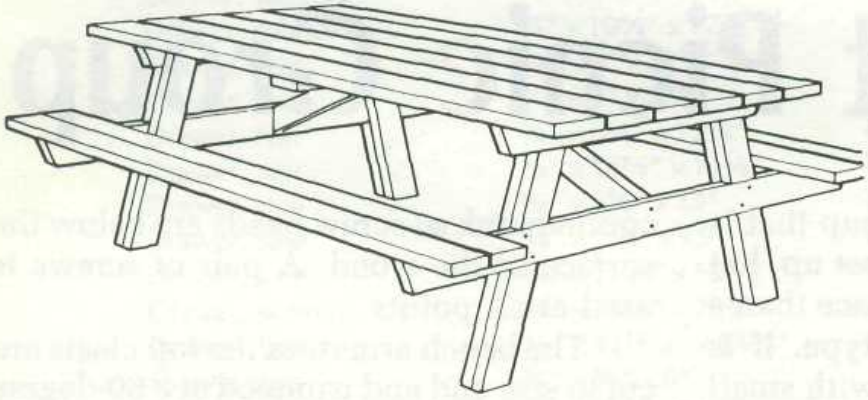
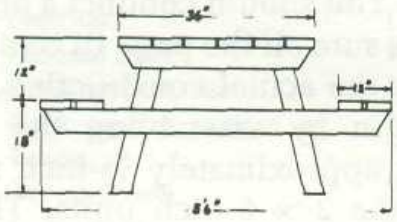
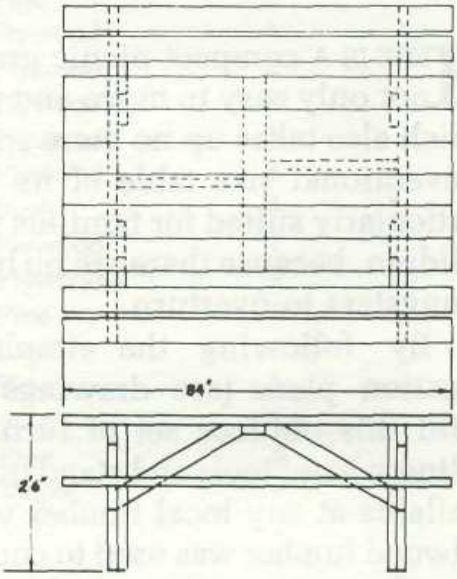


Fig. 14-1. Compact picnic table and bench set accommodates between eight and ten adults. Before beginning actual construction on the set, be sure to lay out all the parts to assure a tight fit.







to build, the interlocking legs and bench support with the lapped construction of the double 2- × -4-inch legs will result in an exceptionally sturdy bench and table set. Diagonal braces, cut at a 120-degree angle are then screwed to the center of the leg units. Finally, right the table to its proper position and fasten the pair of 2- × -6-inch bench boards on each side.

When the group is completely assem-

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MATERIALS LIST

Note: All lumber indicated is redwood.

Purpose	Size	Quantity
Top	2″×6″×84″	6
Cleats	2″×4″×35″	3
Bench arms	2″×4″×65″	2
Top & leg braces	2″×4″×40″	2
Legs	2″×4″×34″	4
Leg doubles	2″×4″×14″	4
Leg doubles	2″×4″×10″	4
Bench seats	2″×6″×84″	4
Wood screws (weather resistant)	3-inch	100

bled, round off the tabletop and seat corners to a 2-inch radius, then sand the entire picnic unit smoothly to eliminate any danger of splinters. The redwood set may be left unfinished to weather into a soft pewter color or stained and top coated for additional protection and long life.

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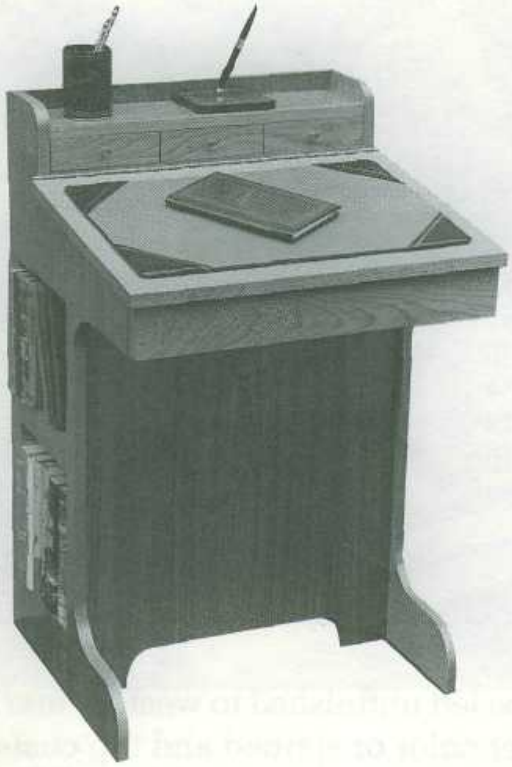

Compact Writing Desk

THIS GRACEFUL DESK features a storage well, a drawer, and two bookshelves which run completely through the unit. A modern version of the famous Davenport styling, it is generously proportioned and equally suitable for child or grownup. The lid slopes slightly toward the front, making it far more comfortable than the usual flat-topped desk. A lid support bracket holds the top open so that both hands are free while tidying up, etc. If the desk is to be used by a girl, a mirror may be mounted on the underside of the lid, so the desk can also double as a vanity.

Plywood construction eliminates the need for gluing boards to make up wide panels, and it also does away with bothersome framing. Construction is clean and simple. Judicious use of cleats permits assembling sections without screws or nails on any exposed surfaces. This is the way professional furniture is made.

You can build this desk using hand tools alone, but the work will go much quicker and easier if you have a saber saw, portable drill and sander. Through judicious planning of your cuts, one 4 × 8–foot panel of ¾-inch plywood should be sufficient. You'll need a piano hinge and a 10-inch lid support.

Lay out the sections on the plywood with the grain running the length of the pieces. Inasmuch as the sides are not symmetrical, be sure to lay them out one faceup and the other facedown.

When all sections are laid out, cut them apart with the saber saw. This should be a rough cut close to the line, just to separate the large board into easy-to-handle sections. Curves are cut freehand, but straight lines should be made with the guide wherever possible. Use a new blade and feed the saw slowly to prevent chipping or splintering.

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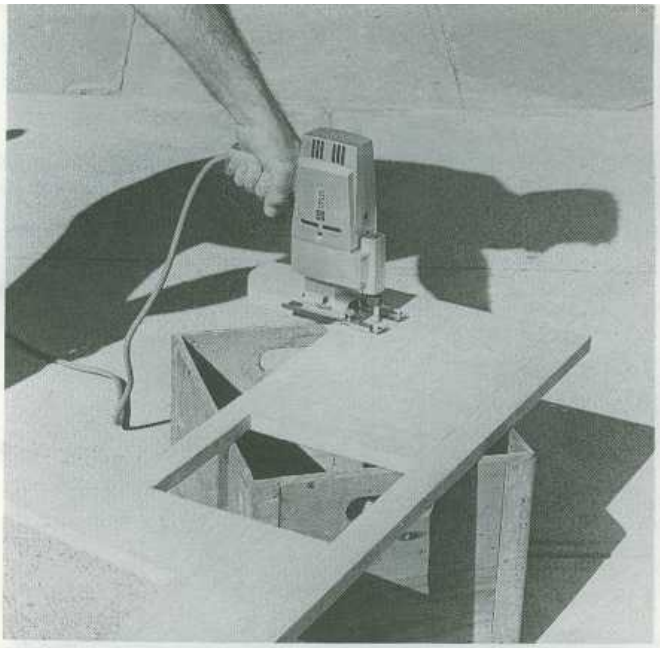

Fig. 15-1. Lay out sections on the plywood and cut apart with saber saw. To make cutouts for bookshelves drill entry hole in one corner.

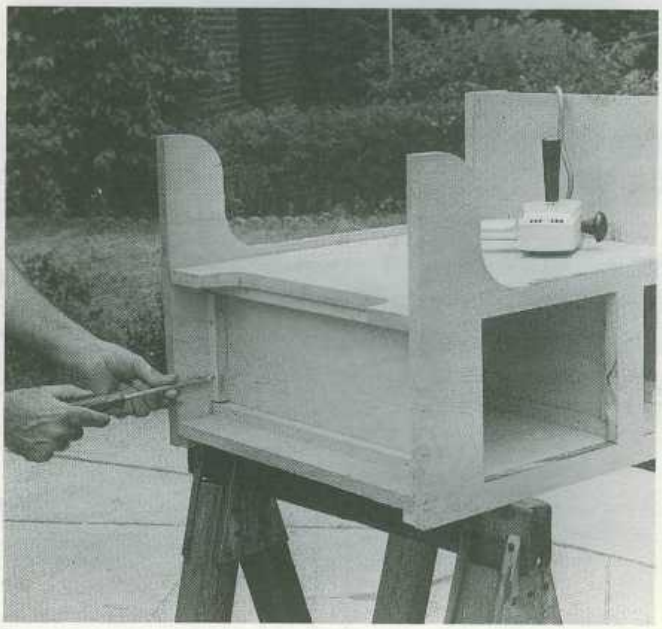

Fig. 15-2. Judicious use of cleats permits assembling sections without screws or nails on any exposed surfaces—a professional technique.

To make the cutouts for the bookshelves, drill entry holes for the blade near one corner, then proceed to drop out the center. When you near the end of the cut, support the waste to prevent it from falling prematurely, since this could damage the work.

Cut all cleats to size and drill pilot holes for the screws as indicated. A screw pilot bit will make the necessary clearance hole including the countersink for the screw head. Spring clamps are fine for holding the cleats.

Fasten the cleats with glue and screws, then follow by assembling the sections, adding the front panel last. The drawer compartment and lid are added to complete the main construction. The drawer is made

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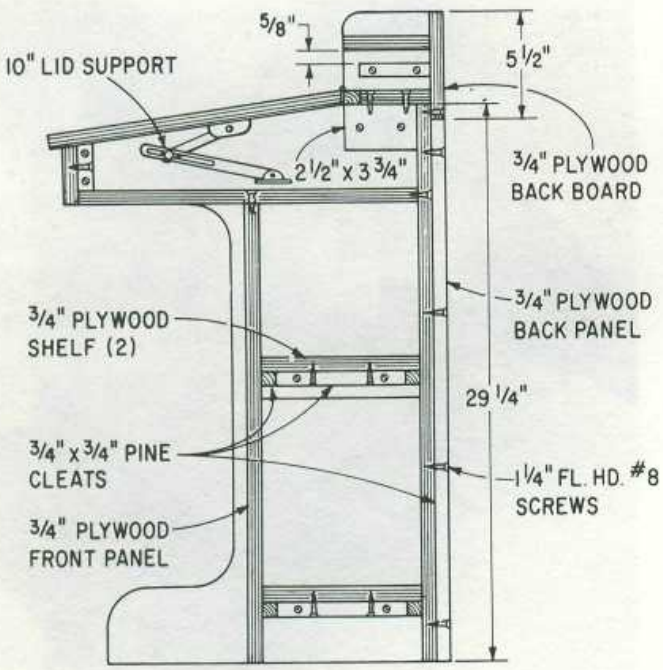
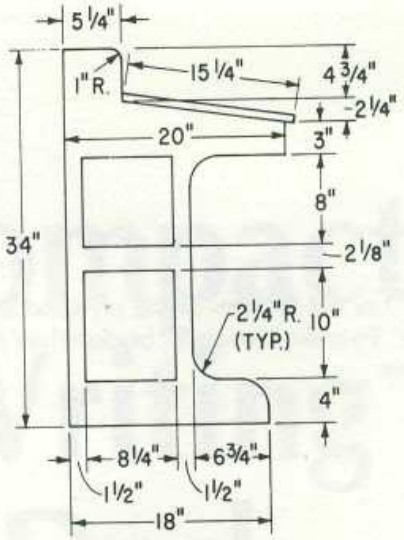
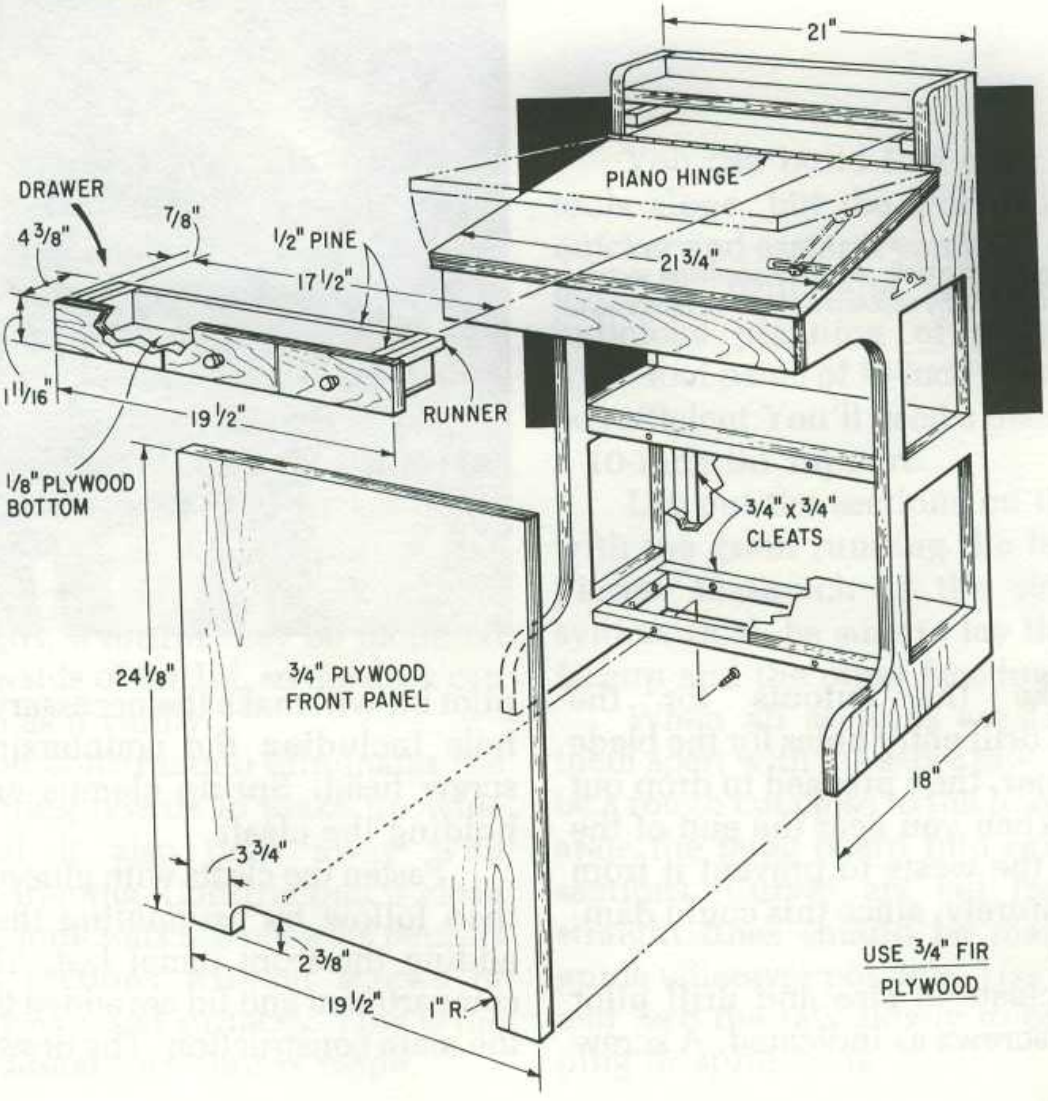


CROSS SECTION



DETAIL OF SIDE



USE 3/4" FIR PLYWOOD

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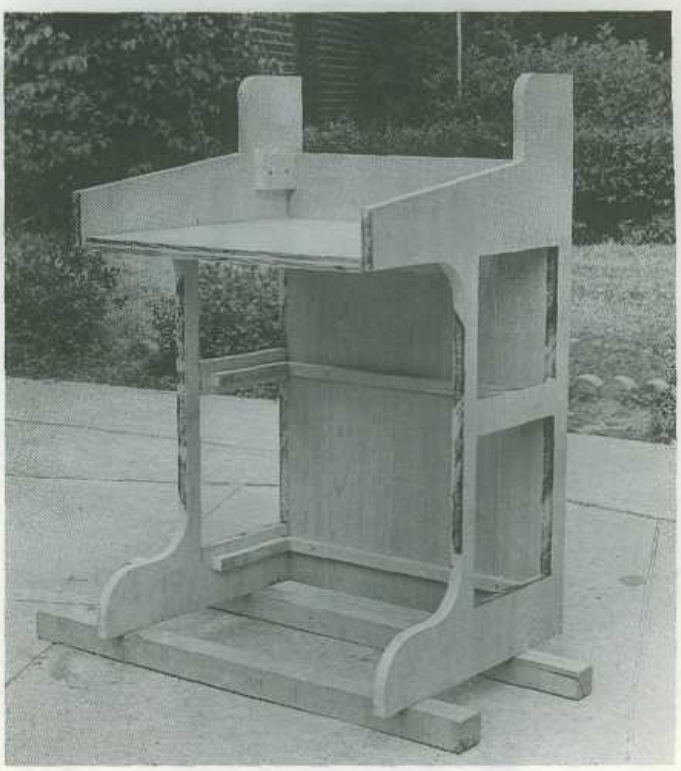

Fig. 15-3. Curves are cut free hand with a saber saw. One piece construction of the sides saves time spent on separate cuts and assembly.

by dadoing the ends as indicated. Make two parallel cuts ½ inch apart and halfway through the stock, then clean out in between with a chisel. Assemble as shown using a small triangular glue block at the bottom front.

Sand all surfaces thoroughly, first with medium grade paper, followed by fine and extra fine.

Finish as desired. A good treatment consists of two coats of clear brushing lacquer followed with paste wax.

The finished desk will beautify any unused space in your home whether it be the bedroom, living room or entry hall, and its usefulness will more than equal its decorative value.

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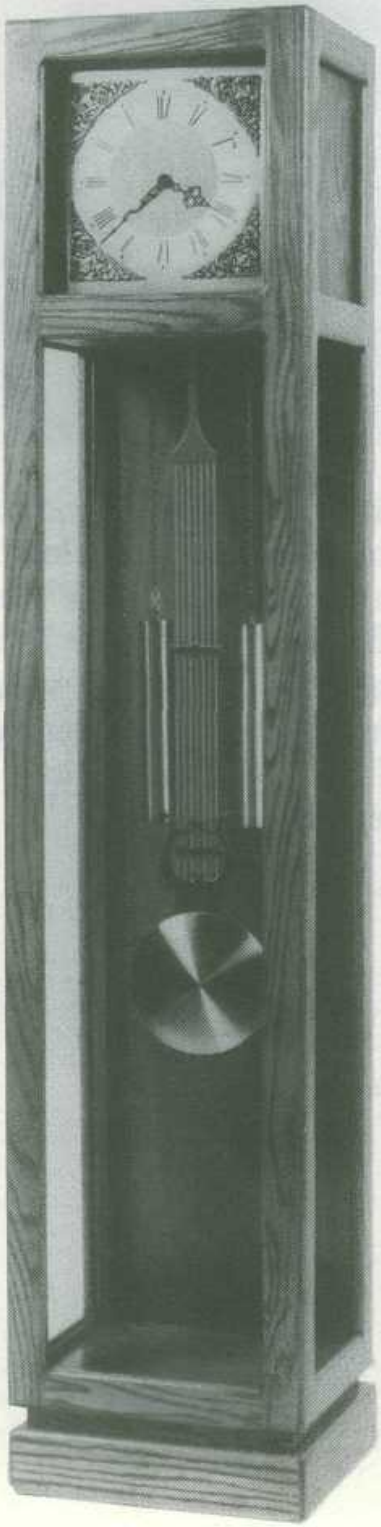
Contemporary Hall Clock



BUILT OF OAK, this contemporary Scandinavian-style Hall Clock has a rich elegant appearance when finished. With straight simple lines, it is easy to build and features a 10-inch-square dial and a choice of two movements, Bim-Bam or Westminster Chime, imported from West Germany. Both movements are weight-driven and can be purchased with a decorative lyre pendulum.

Basically, the clock case consists of three 62-inch frames. The wider one serves as the door. The others make up the end members. Butt joints are used throughout except for the four base pieces which are mitered. A single dowel is used at each butt joint. This means that you'll have to be more careful when gluing as the pieces could twist. Two dowels at each joint would prevent twisting, but two dowels in a 2-inch-wide piece could be a problem, especially with the rabbets and grooves cut in each edge.

The frame members are 2 inches wide, ripped from wide boards. Some lumber dealers sell 2-inch-wide stock. It may cost a little more than the wider boards, but it does save a lot of ripping and jointing.

Select good flat stock, mark and cut the lengths to 62 inches. If wide boards are being used, rip the widths to 2-inches except for the two front stiles which are ripped to 1 3/16 inch widths. Be sure to rip the extra 2-inch pieces for the rails. You will need about 7 feet of 2-inch stock for these.

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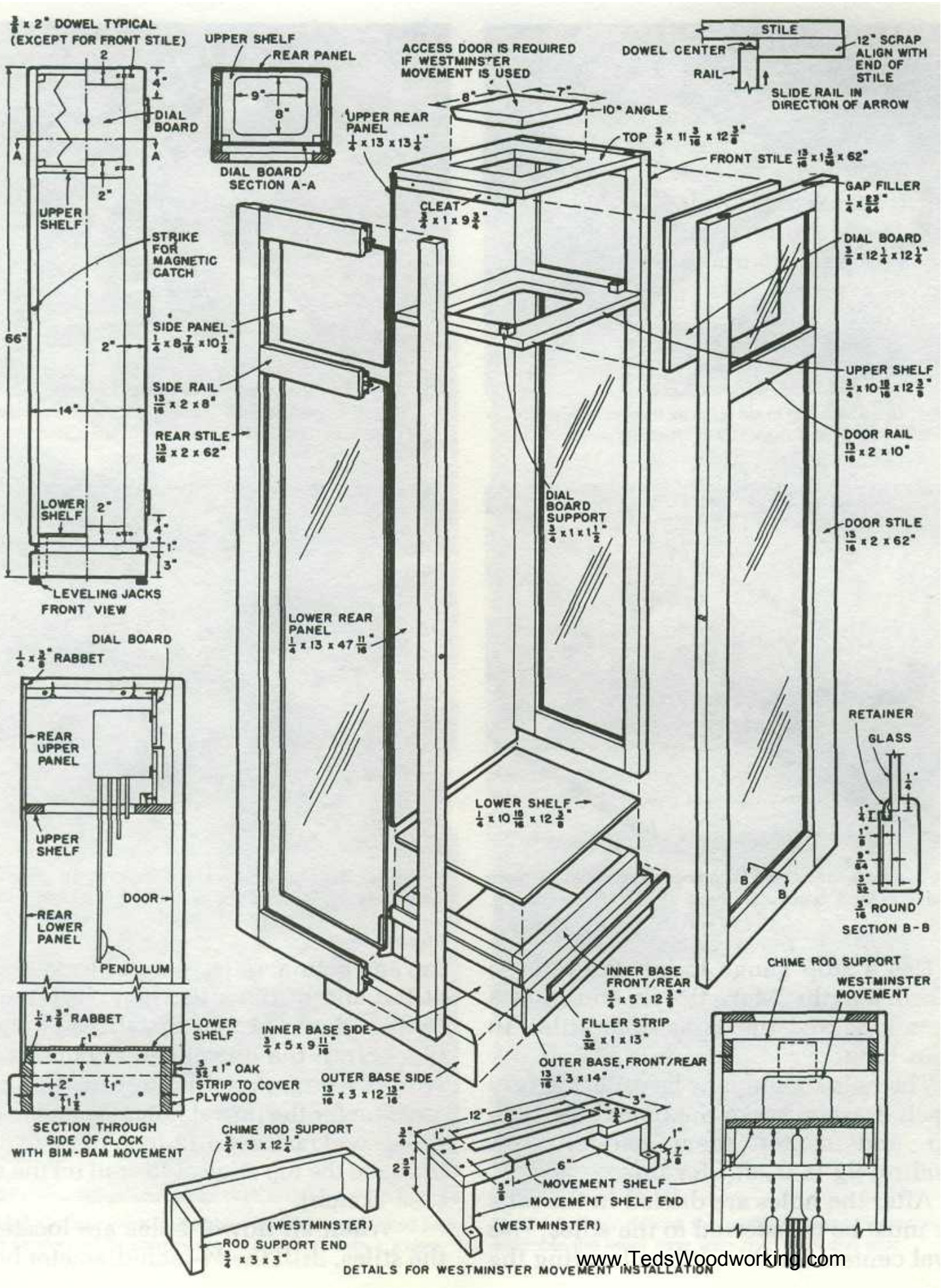

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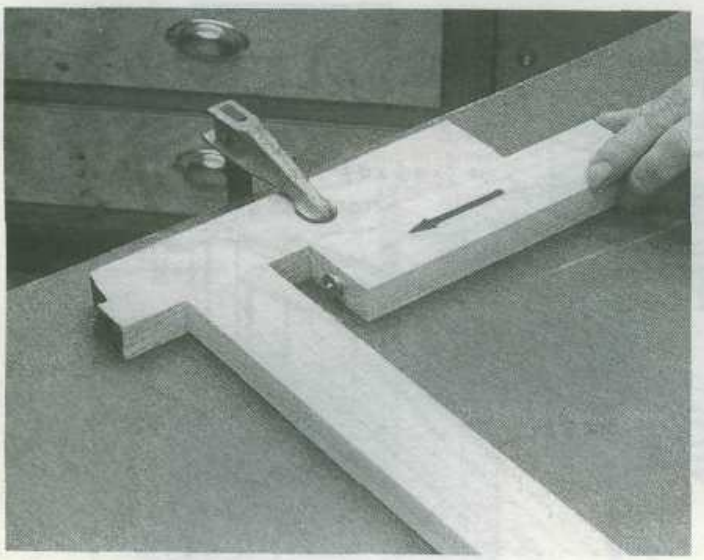

Fig. 16-1. Use a backstop to aid accurate transfer of dowel holes from rails to stiles and mark joints for easier assembly later.

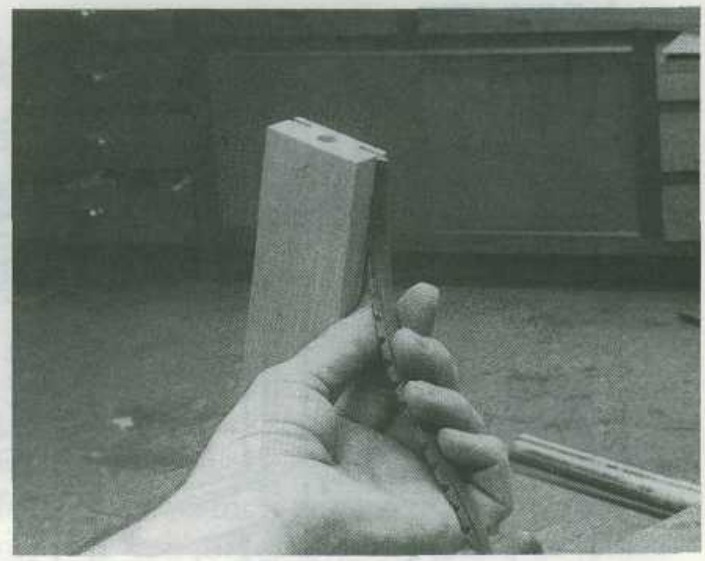

Fig. 16-2. Grooves are cut into frame parts to accept insert-type panel retainer. Test each groove to ensure a snug fit.

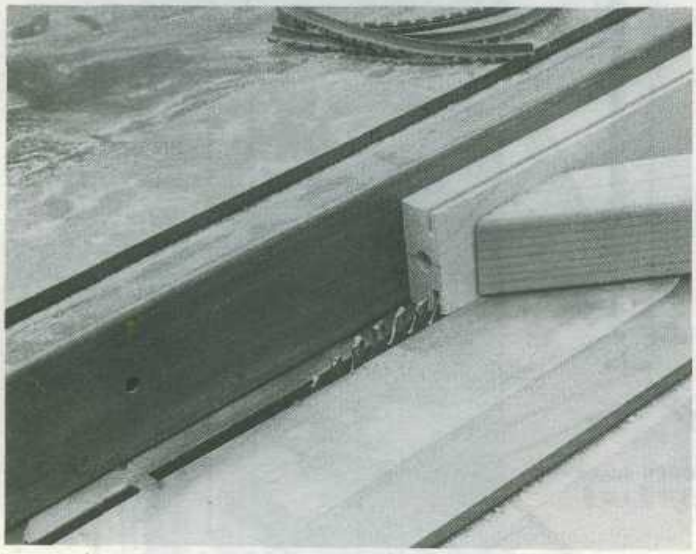

Fig. 16-3. A table saw is used in cutting rabbets; hold the piece vertically on the first cut and horizontally on the second.

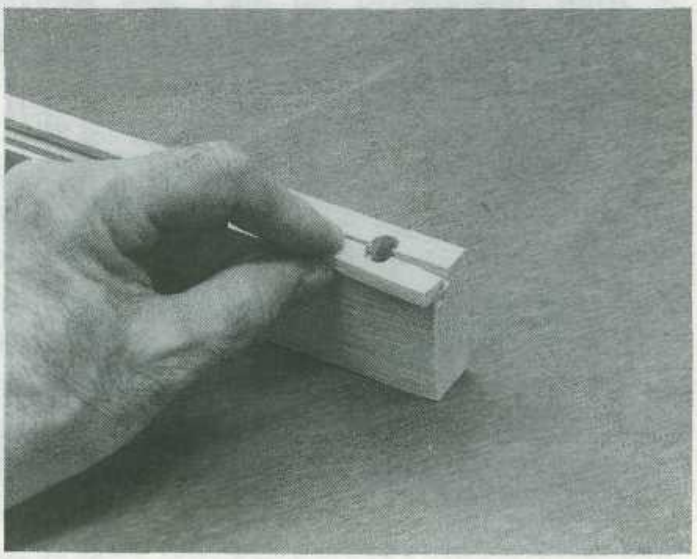

Fig. 16-4. Filler blocks are added to stiles to fill space left by rabbets. Access to dowel holes is cut with a coping saw.

Use a stop gauge to cut the rails to uniform lengths. Make the six end stiles 8 inches long and the three door stiles 10 inches long.

The rails should now be drilled to take ⅜-inch dowels. Make the holes 1 1/16-inch deep and center them carefully. A doweling jig is useful for this.

After the holes are drilled in the rails they must be transferred to the stiles. Use dowel centers for this. When locating the top and bottom rails, place a block of wood at the end of the stile then slide the rail (with a dowel center installed) along the block until the dowel center contacts the stile. The mark will indicate the exact location for the dowel hole. When locating the second rail, use a 12-inch piece of wood to locate the top edge of the rail on the stile. (See sketch).

When all dowel holes are located in the stiles, drill the ⅜-inch-diameter holes,

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1-inch deep. The only exceptions are the holes in the front stiles. These holes should be made only ½ inch deep because this stile is narrower than the rest. Also, the dowels for these holes should be cut to 1½-inch lengths.

If you study the drawing you will note that the edge to receive the glass and retainer is grooved and rabbeted. The groove is cut first; it is 9/64 inch wide and ¼-inch deep. If you have a table saw blade with a 9/64-inch kerf, use it. Otherwise, you will have to make a couple of passes to obtain the required width.

Make test cuts on scrap wood before cutting the actual stock. Make the first pass in all the pieces including the short rail pieces. When all are grooved, adjust the

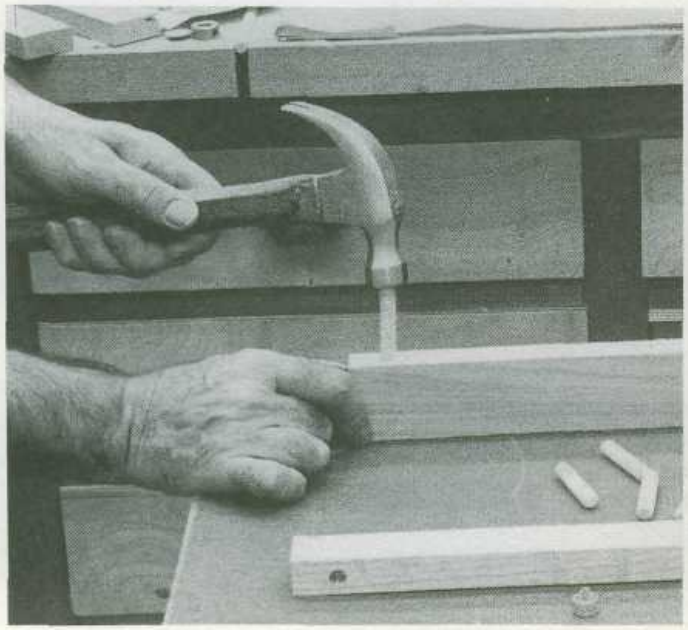

Fig. 16-5. Apply a full-strength glue to the walls of the holes, and then drive the ⅜-inch dowels firmly into place.

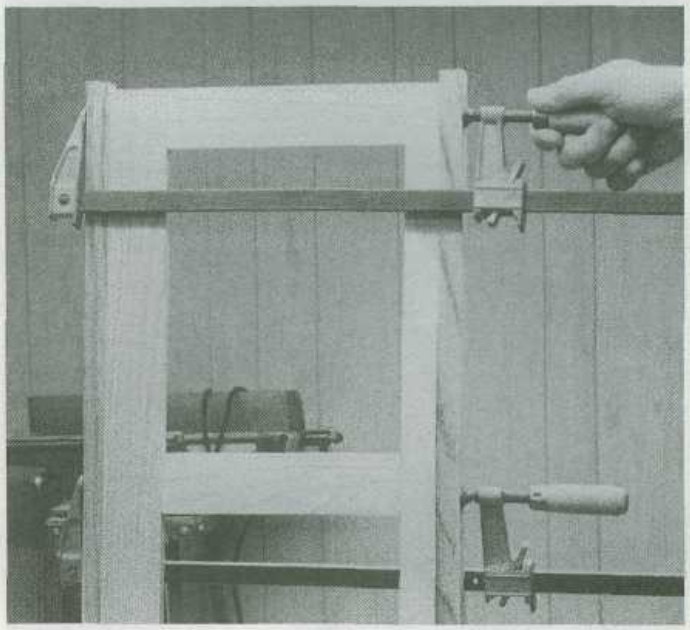

Fig. 16-6. Clamp the pieces together securely, using scraps of wood in the clamp jaws to avoid damaging surfaces of the work.

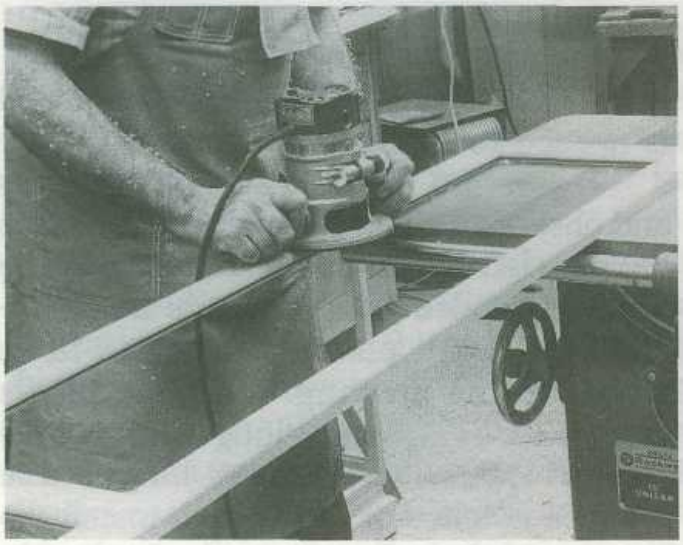

Fig. 16-7. Uneven joints in the glued-up frame are leveled with a belt sander, while corners are rounded off with a router.

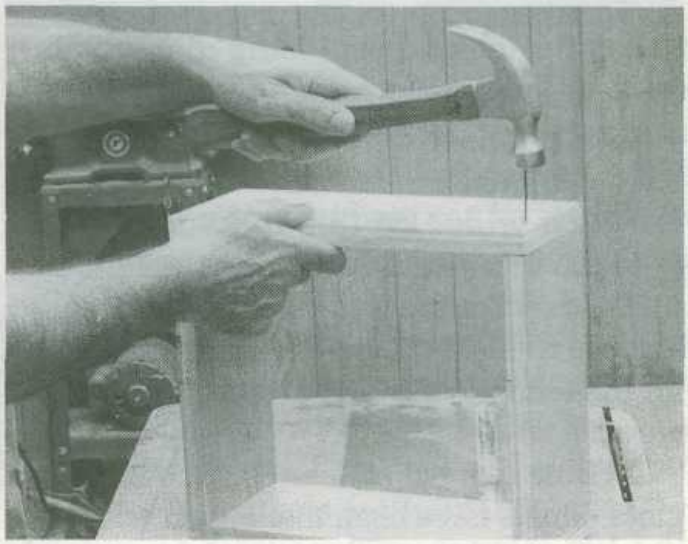

Fig. 16-8. After drilling the required screw clearance holes, assemble the inner base with both nails and glue.

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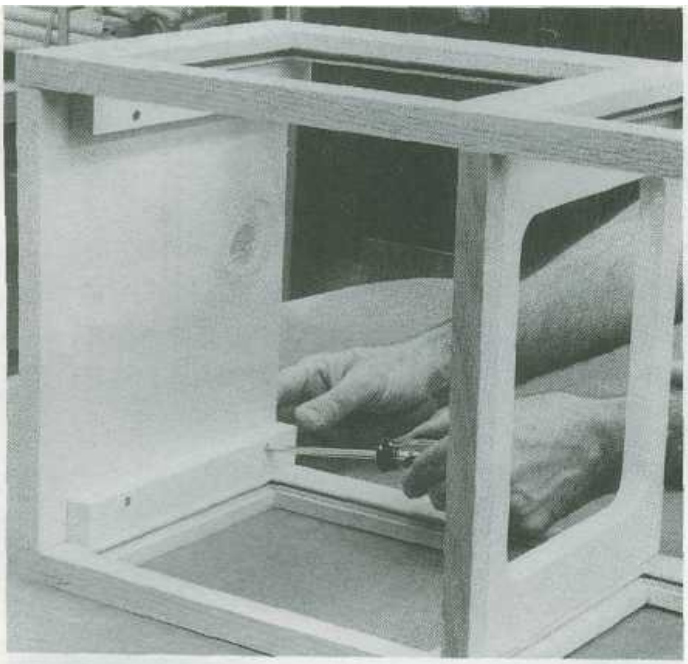

Fig. 16-9. The top is fastened to the side frames with cleats. Note that the cleats are set back to make room for the dial face.

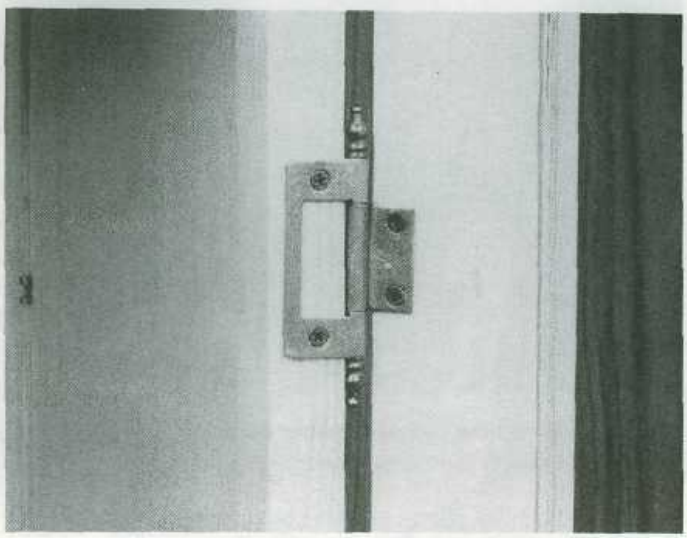

Fig. 16-10. Hanging the door with non-mortise hinges eliminates the need for mortising; three of these hinges are needed.

fence and make the second pass. Follow with the rabbet which is also cut on the table saw. Make the rabbet ¼ inch deep and 23/64-inch wide. Do this in two cuts; first with the work held vertically, then the second pass with the work held horizontally. Be sure to reset the blade height and fence for the second pass. Make test cuts on scrap wood first.

After the grooves and rabbets for the glass panels have been made, you will have to cut the rabbets at the rear of the two rear stiles. This rabbet is made ¼ × ⅜-inch and is needed to receive the plywood panel.

If you butt the rails against the stiles and observe the rear surface, you will note the gap left by the rabbet. This must be plugged or filled before the parts are assembled. Cut small pieces of wood to fit as shown in the drawing. Make six pieces ¼ × 1 23/64 × 1½ inches long and twelve pieces ¼ × 23/64 × 1¾ inches long. These must be notched at the ends to match the grooves of the stiles. Since the pieces are

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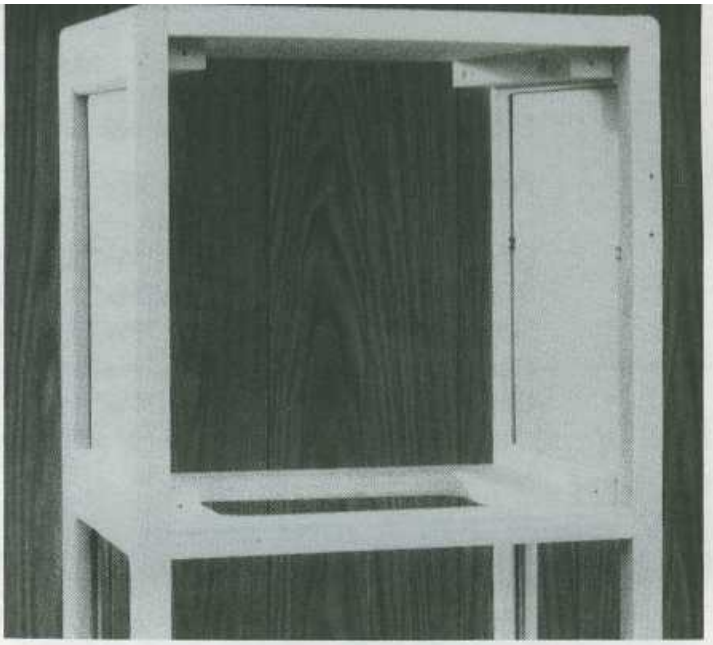

Fig. 16-11. The upper part of the clock case should look like this before putting the dial board and movement in place.

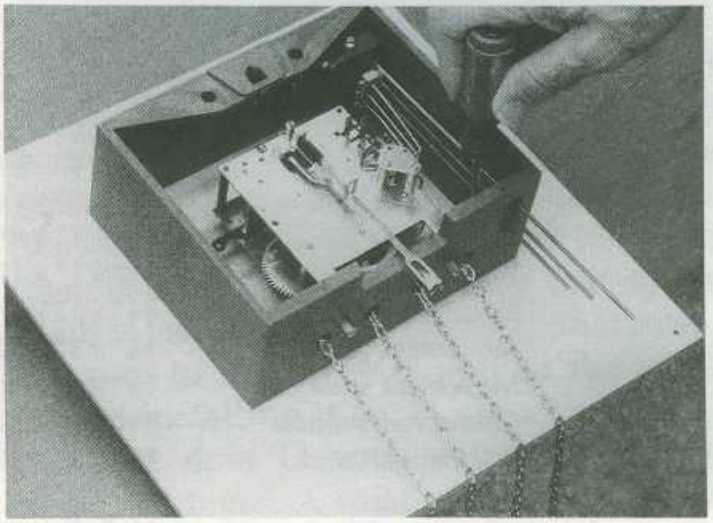

Fig. 16-12. A boxed two-weight movement is fastened to the dial board. Four wood screws should be used to hold it firmly.

small, you won't be able to use the table saw. Instead, use a band saw or coping saw holding the pieces in a vise. The groove is necessary so the panel retainer can be inserted neatly into the center.

Glue the filler pieces into place on the stiles, holding them with a spring clamp or masking tape. When the glue has set, the frames can be assembled. To prevent dry joints, glue size the end grain of the rails using a thin (one part white glue to one part water) coating of glue. Allow to dry about 15 minutes then coat all mating parts with full strength glue. Insert dowels, then join the pieces and clamp securely. Use cauls (scrap strips of wood) under the clamp jaws to prevent marring the work surfaces. The top, shelf pieces and base can be made now while you wait for the glued frame sections to set.

The top is a rectangular board with an access door cut as shown. The door is cut with a jigsaw with the blade set at a 10-degree angle. This will allow the door to drop into place without the need for latches or catches. The angular cut will

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MATERIALS LIST

Except as noted all lumber is oak and all measurements are in inches.

Purpose	Size	Description	Quantity
Stile, rear	13/16" × 2" × 62"		2
Stile, front	13/16" × 1 13/16" × 62"		2
Side rail	13/16" × 2" × 8"		6
Door stile	13/16" × 2" × 62"		2
Door rail	13/16" × 2" × 10"		3
Gap filler	1/4" × 23/64" × 36"		1
Top	3/4" × 11 3/16" × 12 3/8"	Fir plywood	1
Shelf, upper	3/4" × 10 15/16" × 12 3/8"	Fir plywood	1
Shelf, lower	1/4" × 10 15/16" × 12 3/8"	Oak plywood	1
Base front/rear, inner	3/4" × 5" × 12 3/8"	Fir plywood	2
Base side, inner	3/4" × 5" × 9 11/16"	Fir plywood	2
Base front/rear, outer	13/16" × 3" × 14"	Oak	2
Base side	13/16" × 3" × 12 13/16"	Oak	2
Filler strip, front	3/32" × 1" × 13"	Oak	1
Filler strip, end	3/32" × 1" × 13"	Oak	2
Side panel	1/4" × 8 7/16" × 10 1/2"	Oak plywood	2
Rear upper panel	1/4" × 13" × 13 1/4"	Oak plywood	1
Rear lower panel	1/4" × 13" × 47 11/16"	Oak plywood	1
Cleat	3/4" × 1" × 9 3/4"	Pine	2
Dial board support	3/4" × 1" × 1 1/2"	Pine	2
Dial board	3/8" × 12 1/4" × 12 1/4"	Plywood	1
*Movement shelf	3/4" × 3" × 12"	Fir plywood	1
*Movement shelf end	3/4" × 2 5/8" × 4"	Fir plywood	2
*Chime rod support	3/4" × 3" × 12 1/4"	Fir plywood	1
*Rod support end	3/4" × 3" × 3"	Fir plywood	2
Dowel	3/8" × 2"		18
Magnetic catch	5/16" dia.		1
Hinge	2"	Non-mortise	3
Panel retainer		Insert type	30'
Screw	No. 8—1 1/2" FH		34
Screw	No. 8—3/4" FH		4
Screw	No. 5—3/4" FH		22
Leveling jacks	miniature		4
Glass, door upper	Cut to fit		1
Glass, door lower	Cut to fit		1
Glass, side	Cut to fit		2
Dial	10" × 10"		1
Movement		Bim-Bam or Westminster	1

Note: The items marked with asterisks are required only if Westminster Chime Movement with separate chime rods is used.

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permit the door to drop in without any space between the kerf thus keeping out dust.

The upper shelf is made with a cutout to allow chains, weight shells and pendulum to pass through to the waist section.

The base consists of two parts, inner and outer. Plywood is used for the inner base pieces. Cut the parts to size then drill the screw clearance holes before assembling the parts. The outer base pieces are cut to size then mitered.

Assemble the inner base using nails and glue, then add the oak outer pieces fastening them to the inner base with 1½-inch screws as shown. Apply glue to the mitered corners. Do not glue the outer base pieces to the plywood.

Cut three thin strips of oak, 3/32 × 1 × 13 inches long. Glue these to the plywood just above the outer base pieces. They serve to conceal the plywood underneath. Cut the end pieces to length, taking the measurements directly from the base piece. Glue these into place, then cut the front to size and install. None is required at the rear as it won't show.

Use a router with a 3/16-inch rounding bit to round off all corners of the base.

The glued-up frames should now be ready for work. Remove the clamps and place a frame on a flat surface. Sand the entire surface with a belt sander. Pay particular attention to the joint areas. Sand the front and back of each frame, then use the router to round off the corners as indicated.

The end frames can now be attached to the base and top sections. Cleats are used at the top. Be sure to set the cleats to the rear leaving room at the front ends for the dial board. Screws are used to fasten the cleat to the sides and top. The upper shelf is fastened only with glue, no screws. Be sure to make the cutout in the shelf before installing it.

The door is hung using three non-mortise hinges. A small magnetic catch is used on the door. Drill a 5/16-inch-diameter hole 9/16 inch deep into the door stile then install the magnet strike on the front stile. Since a small magnet is used, no door pull is necessary. Simply grasp the stile to open.

The glass should be installed after the finish has been applied. The best way to secure the glass is to use insert type plastic retainer. This material is made to fit into a narrow groove allowing the top or exposed part to hug the glass snugly. It eliminates the need for staples or nails and provides very neat appearance. Another

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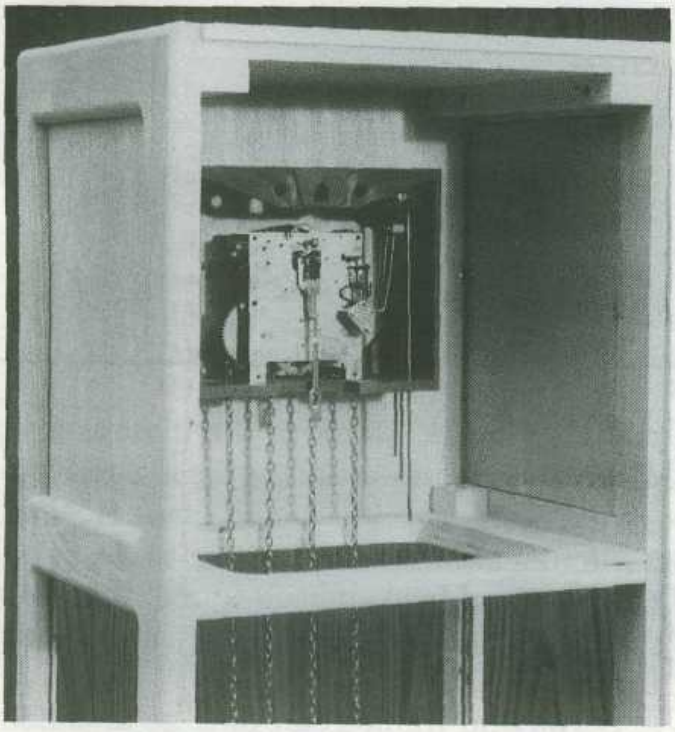

Fig. 16-13. The Bim-Bam movement, shown installed above, does not require any shelves or supports to be added to the upper case.

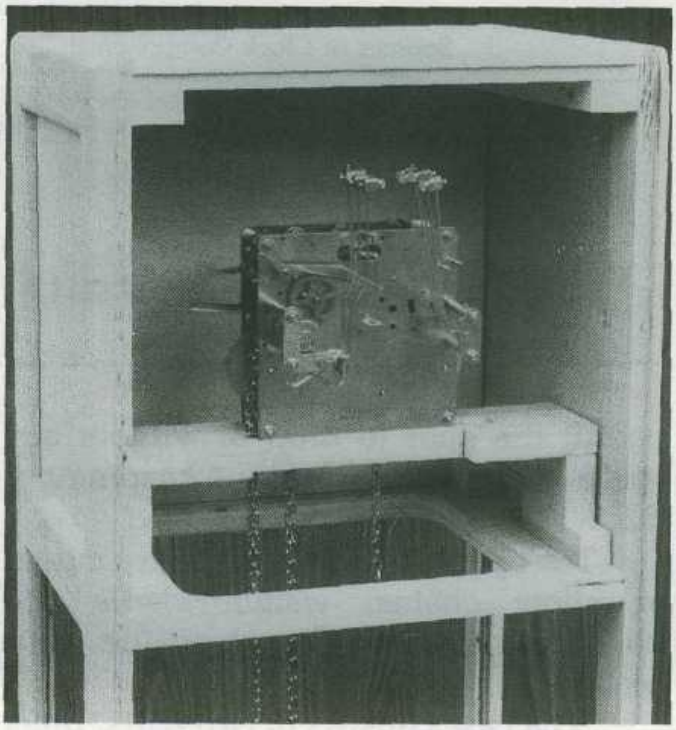

Fig. 16-14. Appearing without chime rods in the above view, the Westminster movement requires a shelf and chime rod support.

advantage of this material is its ease of removal when necessary to replace or clean the glass. Force it all the way down into the groove with your fingertips.

The movement used will determine if special shelf and support are required. If the Bim-Bam movement is used, no supports are required as the movement is boxed and simply screwed to the rear of the dial board. If the Westminster movement is used, a shelf and chime rod support will be needed. These are shown in the drawing. However, be sure to have the movement on hand before making these supports as the sizes may vary depending on the make of movement.

The wood is finished by using a paste wood filler followed by two coats of sanding sealer and two coats of semigloss lacquer. The filler used was Golden Oak which contains the stain mixed in with the filler. After applying the filler, allow to dry overnight before applying sealer and lacquer.

The filler, flexible molding, hardware, clock movement and dial are available from Armor Products (see Introduction). Other sources of clock movements and components are listed in the Materials List. Write them for catalogs.

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Corner Bookcase/ Desk

CORNERS usually present a problem when decorating a room. Here's an ideal piece of furniture that will fit neatly into that wasted corner and serves as a combination desk andbookcase. The desktop provides ample writing space and storage for stationery,bills, pens, clips, etc. The two bottom shelves hold a stack of your favorite books within easy reach.

The desk is very easy to make as it utilizes ready-made turnings which are available at lumber dealers and home improvement centers throughout the nation. It is made of common pine and only a few basic tools are needed. A drill and saber saw are essential. A router is needed only if you want to shape the edges of the desktop and drawer front. These could be rounded off with a hand plane instead.

The desk measures 30¼ inches high × 40 inches wide × 25 inches deep. The top provides a writing area of more than 3 square feet.

Unless you use plywood, the top and shelves must be glued up to obtain the proper width. The top involves straight or parallel gluing. The shelves, however, must be mitered. This looks tricky but it can be done easily by using cleats and clamps as shown. Select flat boards and arrange them so that knots will not fall on the cutting lines. Lay out the shelves and draw the 45-degree lines for the miter cuts. The cuts can be made in several ways. The table saw, portable saw or saber saw may be used.

Regardless of the saw used, the cut edges must be perfectly square and smooth. After cutting, a router can be used to true up the edge. This is done with a flush trimmer bit. A guide strip of ¾-inch stock is nailed to the bottom of the shelf. Set the strip exactly at 45 degrees using a miter square as a guide. Set the strip so that it is just a trifle in from the edge. About 1/32 inch will do.

Adjust the cutter so that the bearing will ride on the strip. Take a cut and check the edge. It should be smooth and straight. Incidentally, the edge will be as straight as

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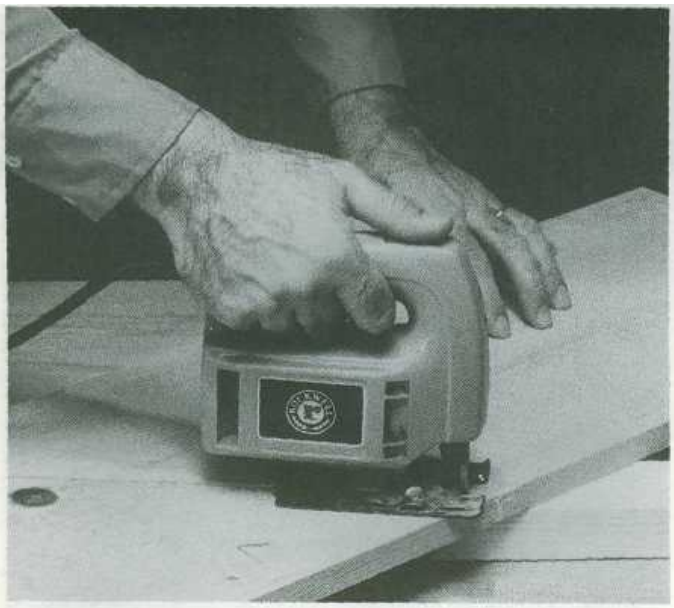

Fig. 17-1. The miter is cut with a saber saw. Be sure to use fine blade, and cut slowly.

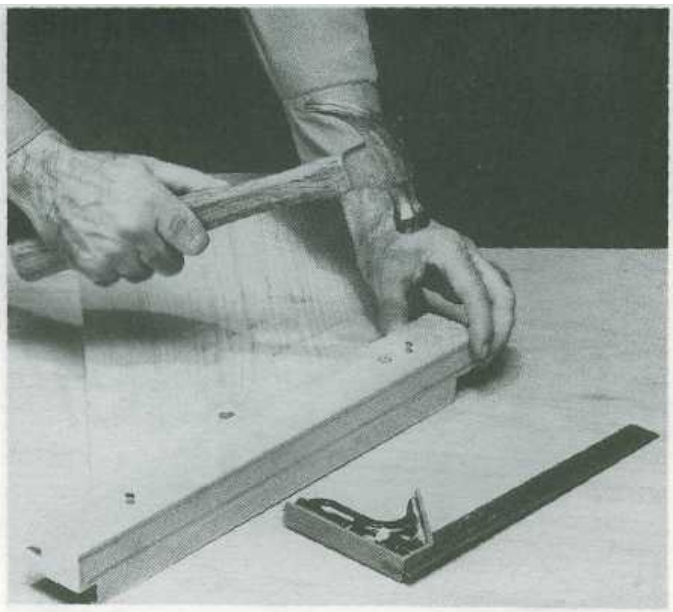

Fig. 17-2. Guide strip's nailed to the underside of shelf. It should be set in from edge.

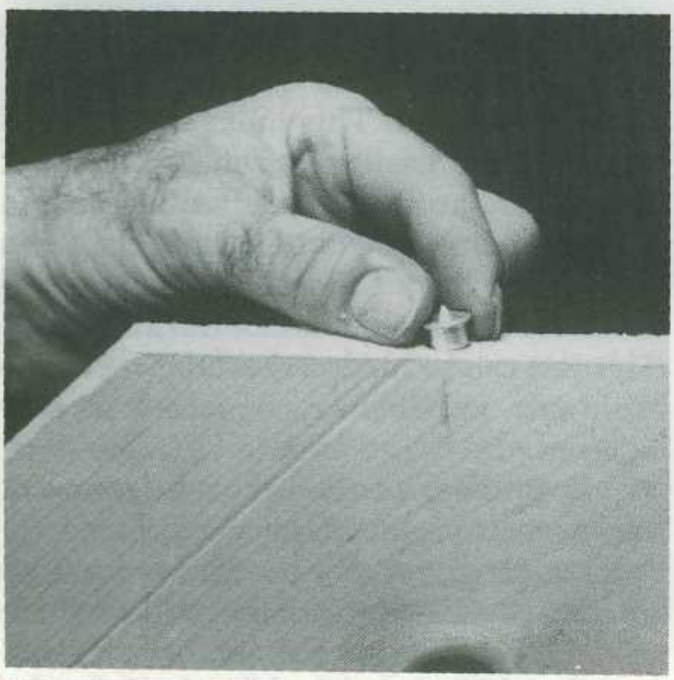

Fig. 17-3. Insert dowel centers into holes; the sharp point transfers center to mating board.

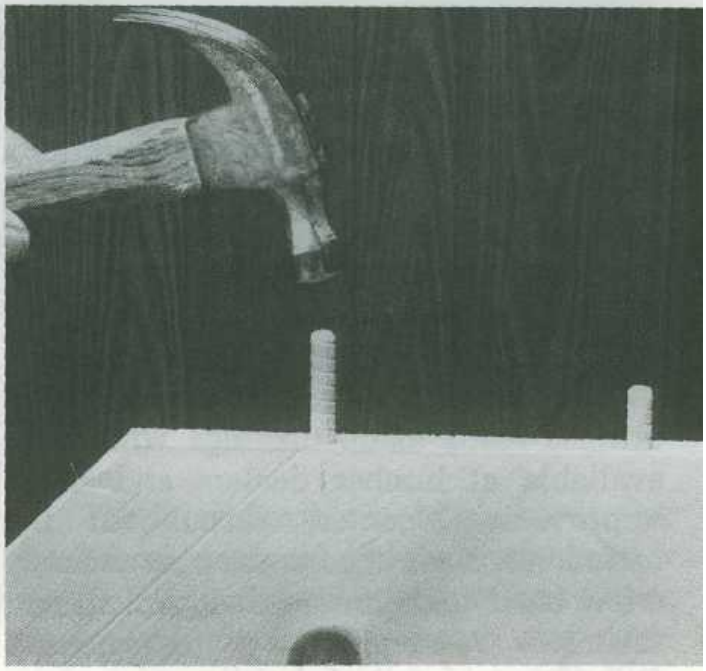

Fig. 17-4. Glue is applied to the lower half of the dowel. Hammer blows drive them home.

the guide strip so be sure to choose a good straight piece for the guide.

Mark the location of the dowels. These should be placed as shown so they will clear the postholes and the curved edge which will be cut later on. A dowel drilling guide is used for the next operation. Several types are available.

The units are self-centering and assure straight accurate holes. Drill ⅜-inch-diameter holes 1¼-inches deep to accept the 2-inch spiral dowels. Dowel centers are

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used to locate matching holes in the mating pieces.

Insert three dowel centers in the holes drilled into the first piece. Align the two boards then press together. The hole centers will be transferred to the second piece. Drill these holes to the same depth as the first piece.

Because the end grain is porous, it will be necessary to size the edge with a thin

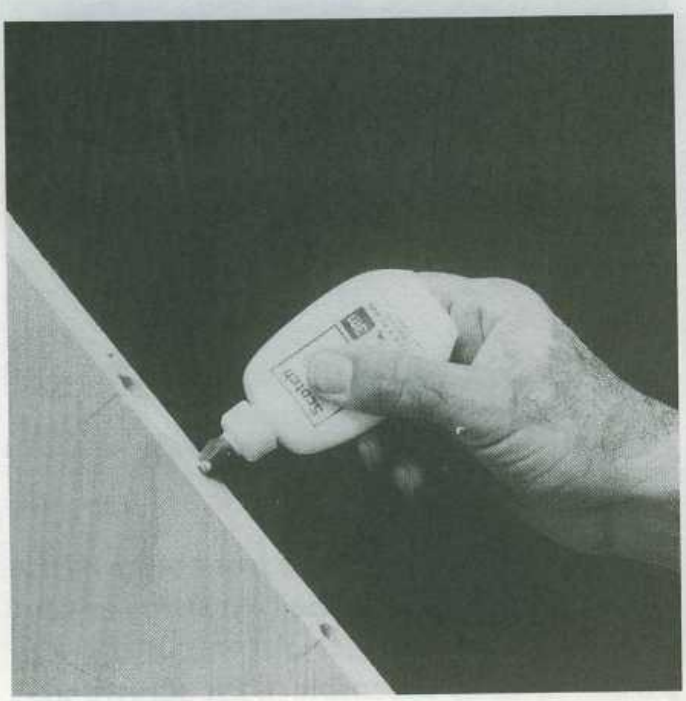

Fig. 17-5. Apply glue to edge grain to size it. Apply second coat before joining the parts.

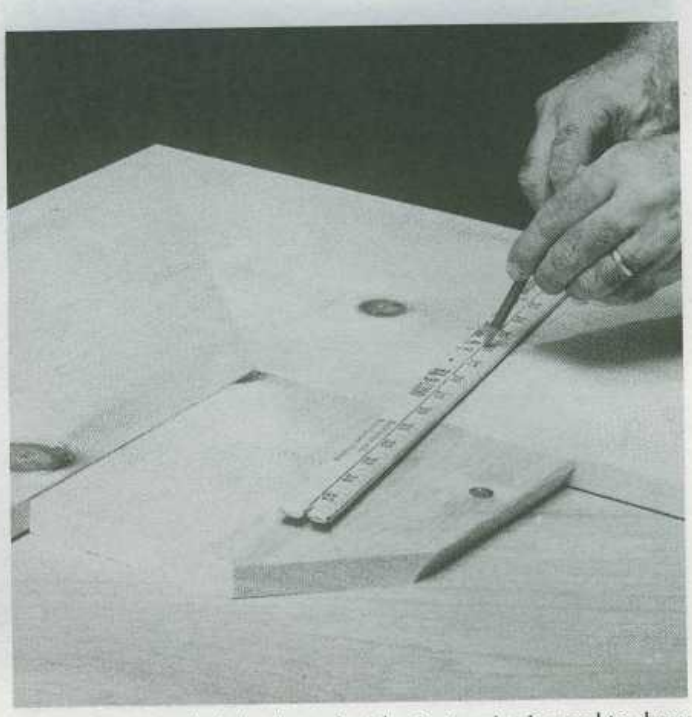

Fig. 17-6. A yardstick adapted with pivot point is used to draw the radius for the shelf.

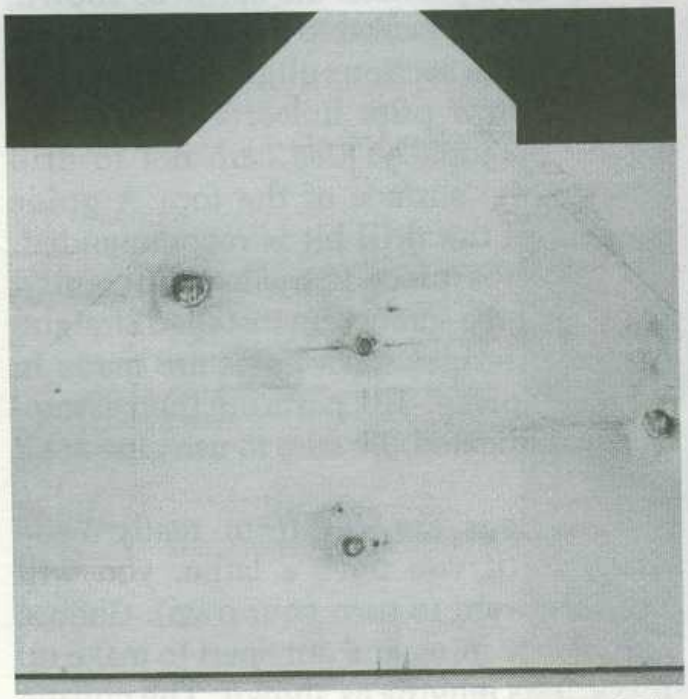

Fig. 17-7. Desktop is glued up in order to conserve wood. The knots should be sound.

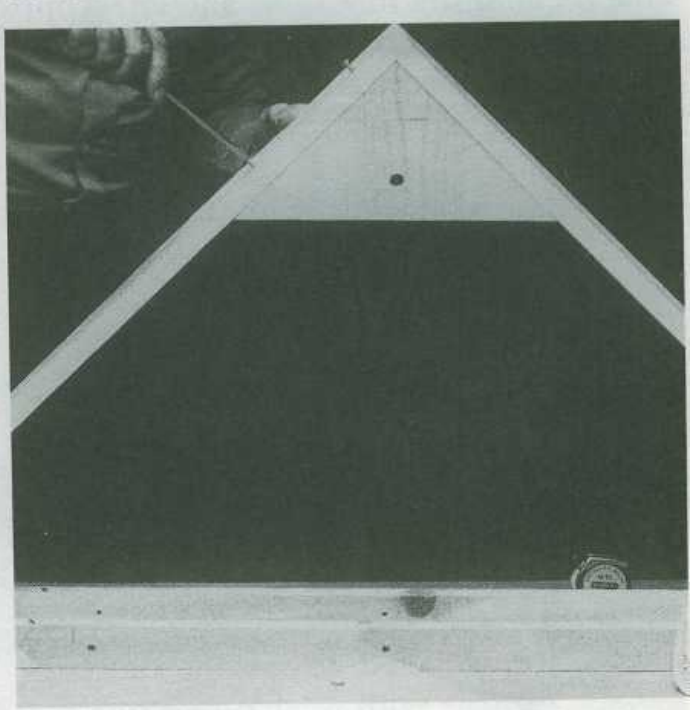

Fig. 17-8. The desk sides are assembled with glue, screws. Predrilled holes are for the legs.

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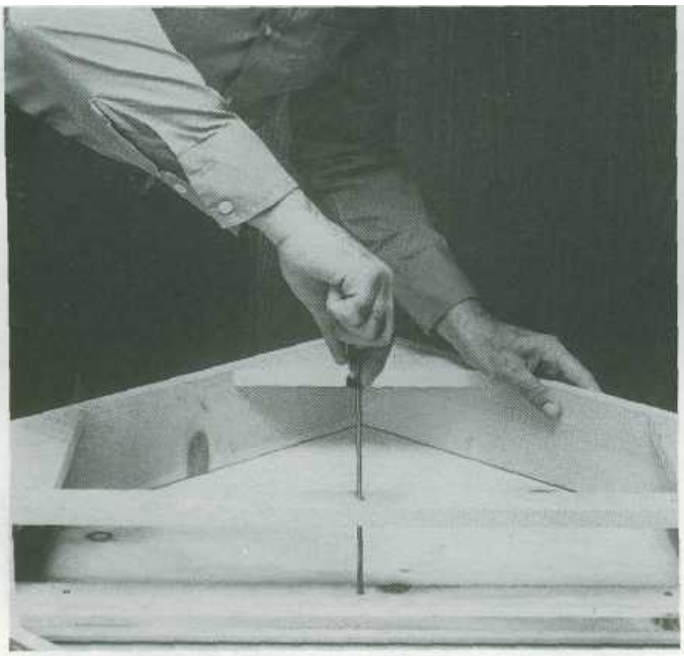

Fig. 17-9. Clearance holes are drilled through the crosspiece to allow screwdriver to enter.

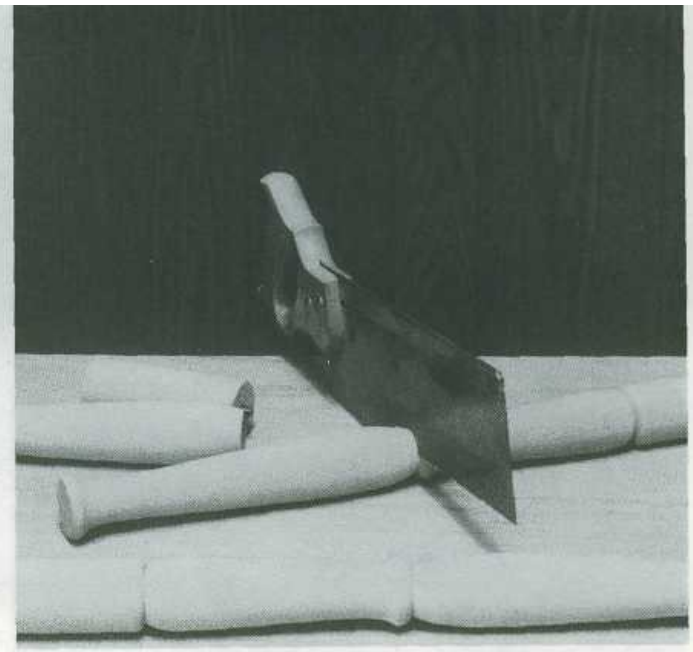

Fig. 17-10. The stock legs are cut apart with back saw. A radial arm saw can also be used.

coat of glue. Apply a bead of glue then spread and allow to dry. Apply some glue to the dowels and insert. Tap with a hammer until the dowels are halfway into the holes. To obtain a good tight joint, attach clamping blocks as shown. Apply more glue to the edges and to the dowels, then join the pieces and clamp tightly. The clamping blocks should be 2- × -3 or 2- × -4 lumber. Draw the pieces together until the glue starts to ooze out of joint. Be sure the boards are flat. Use clamps on both sides.

The top is also glued with dowels. Follow the same procedure to make the holes then clamp using glue strips on the edges. To save lumber for the top piece, you can step the sections as shown.

Set the shelves and top aside, allowing the glue to set thoroughly. In the meantime, you can cut the pieces for the apron and front frame. The rear edges of the side pieces are rabbeted to accept the back panels. Do this with a table saw or use a backsaw and finish off with a chisel.

The bevel cut for the front edge of the sides and the ends of the two strips are cut at a 45-degree angle. After cutting the pieces to size, assemble with screws and glue. After the apron is assembled, invert the top then position the apron as shown. Strips of wood tacked to the front and sides will keep the sections aligned while drilling the screw pilot holes. The holes are drilled diagonally. Use care not to drill through the surface of the top. A guide marked on the drill bit is recommended.

The crosspiece is treated differently. Here the three screws are installed straight. Screwdriver clearance holes are made in the lower piece. The parts are then assembled as indicated. Be sure to use glue at all joints.

The legs are cut from ready-made turnings. (If you have a lathe, you will probably want to turn your own). Choose a suitable turning and cut apart to make up the various lengths as shown. The cutting can be done with a handsaw or on the

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radial arm saw. Be sure the lengths are uniform and all cuts are square. If done by hand, a miter box should be used. The turnings we used are colonial style 28 inches long. They are manufactured by Michael-Reagan of California and we understand they are available throughout the country.

After cutting the turnings apart, drill the centers to take ½-inch dowels. Make the holes 1½ inches deep and be sure to center them. Drill corresponding holes ½-inch diameter in the two shelves to correspond to the holes previously made in the lower part of the top section. Also shape the edges at this time.

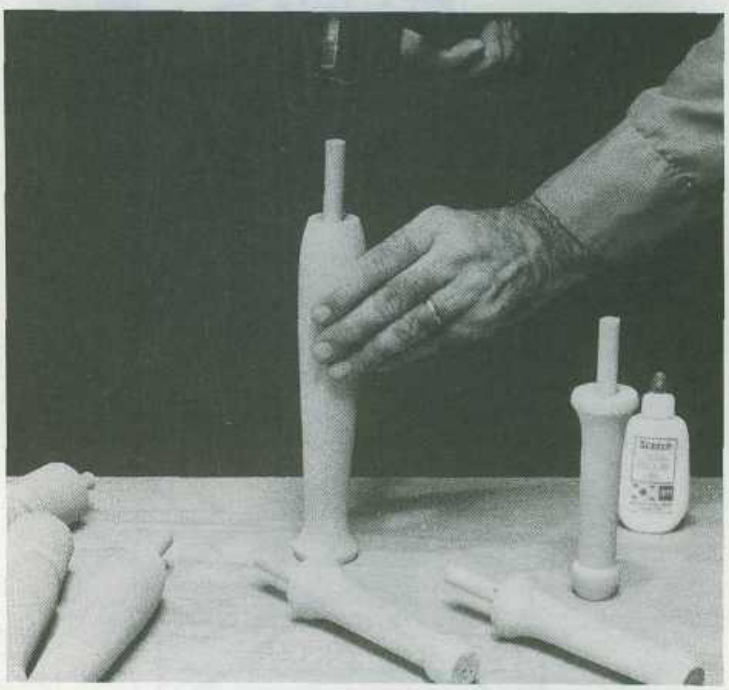

Fig. 17-11. Dowels are driven into the upper section of leg. Be sure to groove dowel.

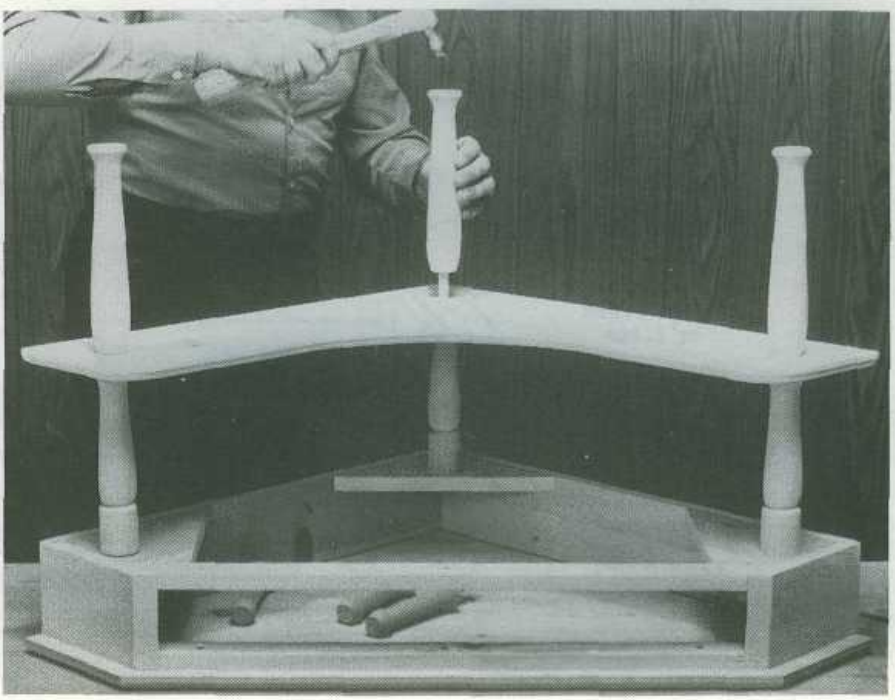

Fig. 17-12. Assembling the desk is simple. Add the shelves and legs to the inverted unit.

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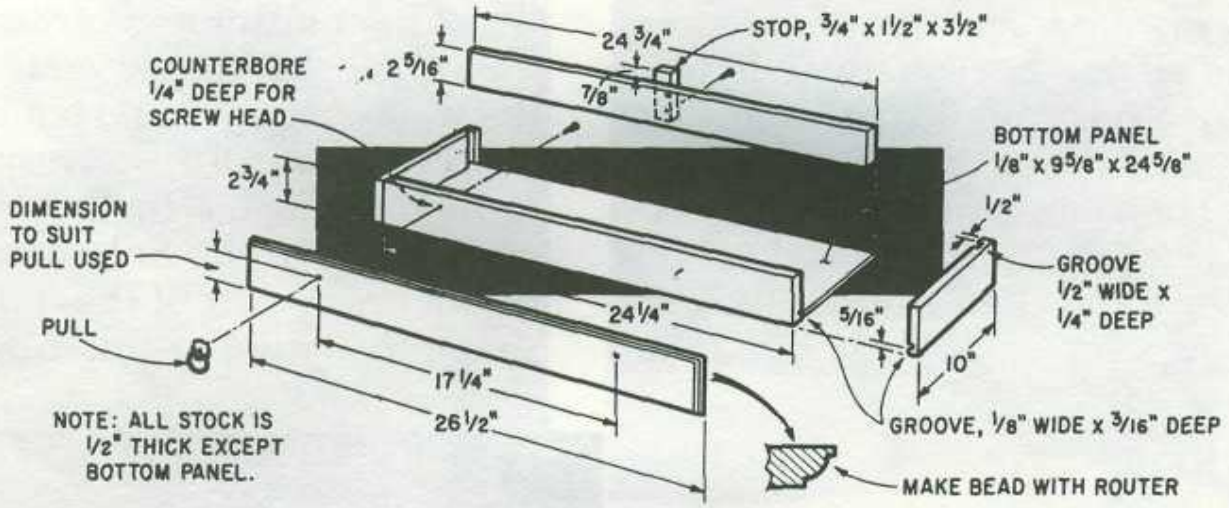
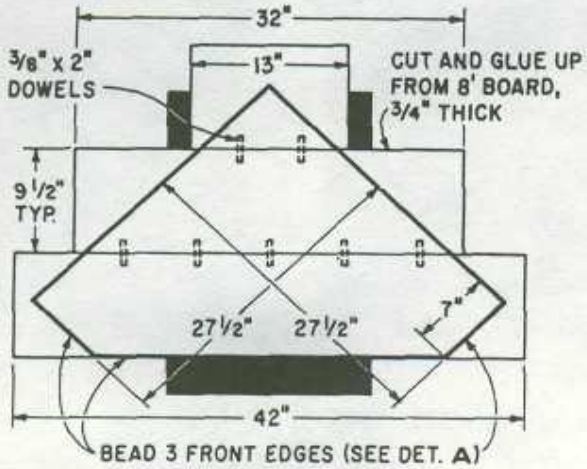
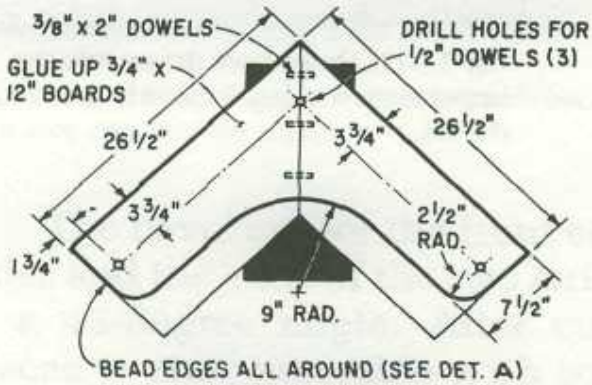


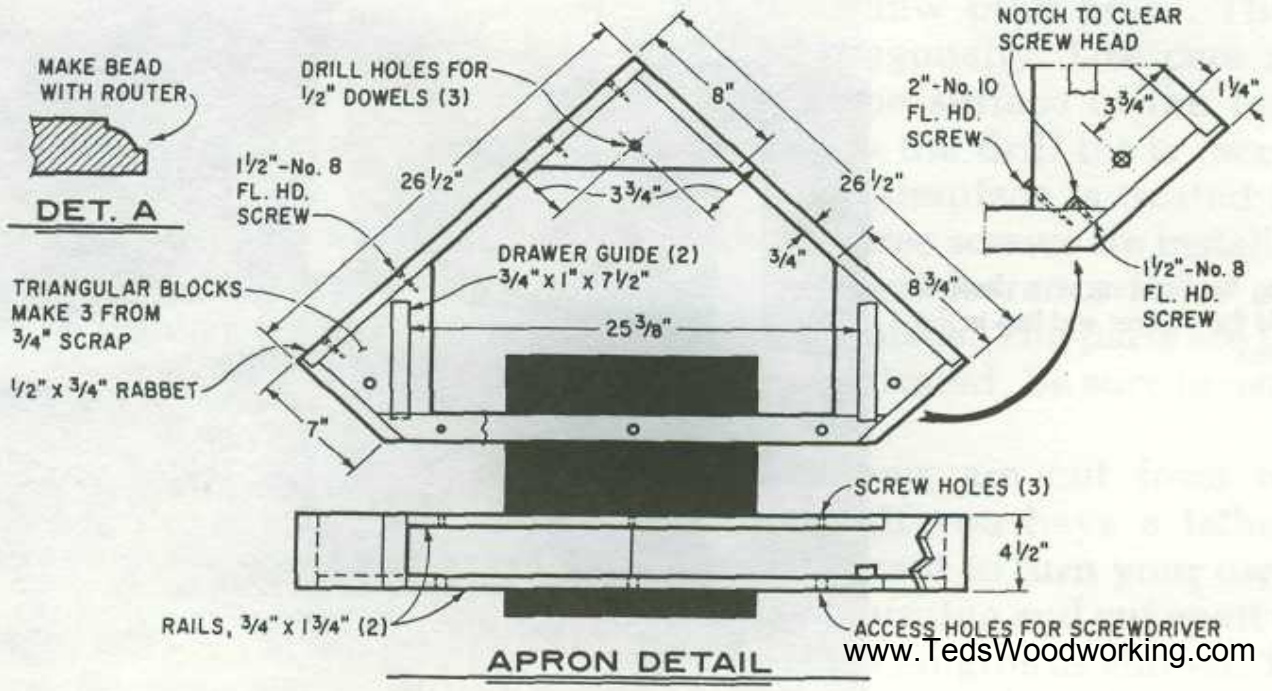
DRAWER DETAIL



TOP DETAIL



SHELF DETAIL



APRON DETAIL

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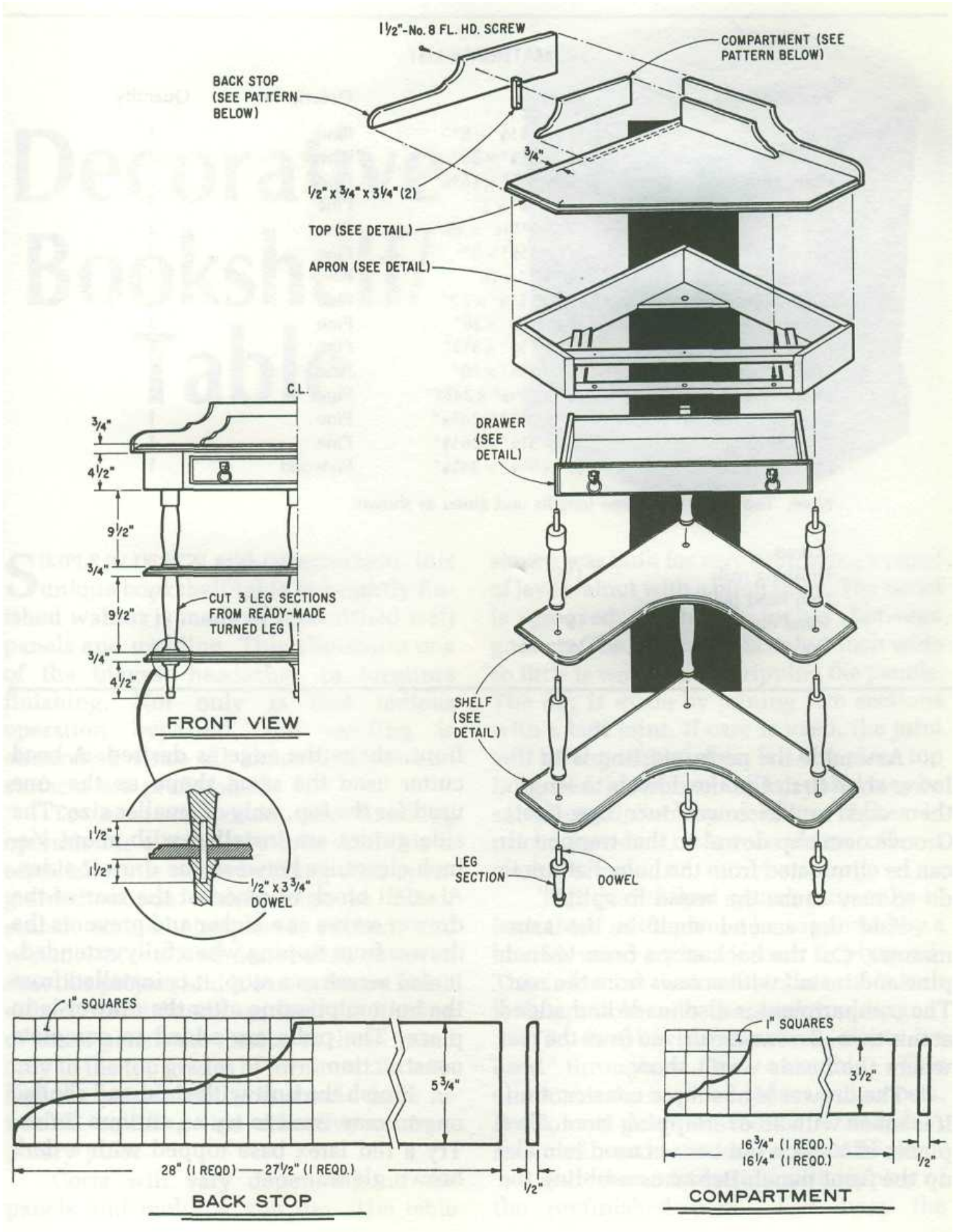

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MATERIALS LIST

Purpose	Size	Description	Quantity
Top	¾" × 11¼" × 8"	Pine	1
Back stop	½" × 5¾" × 28"	Pine	2
Compartment	½" × 3½" × 16¾"	Pine	2
Compartment blocks	½" × ¾" × 3"	Pine	2
Rail	¾" × 1 11/16" × 29"	Pine	2
Sides	¾" × 4½" × 8"	Pine	2
Corner blocks	¾" × 7" × 10"	Pine	3
Shelf (half)	¾" × 11¼" × 27"	Pine	4
Turnings	1¾" dia. × 28"	Pine	3
Kicker	¾" × 1½" × 3¼"	Pine	1
Drawer (side)	½" × 2¾" × 10"	Pine	2
Drawer (rear)	½" × 2 5/16" × 24¾"	Pine	1
Drawer (subfront)	½" × 2¾" × 24¼"	Pine	1
Drawer (front)	½" × 3¼" × 26½"	Pine	1
Drawer (bottom)	⅛" × 9⅝" × 24⅝"	Plywood	1

Note: Top is cut into three lengths and glued as shown.

Screws		
Finishing nails	1½"	
Lion head pulls		2
Spiral dowel	⅜" × 2"	13
Dowel	½" × 36"	1

Assemble the parts, starting with the lower shelf first. Cut the dowels to length, then add to the lower turnings (feet). Groove or crimp dowel so that trapped air can be eliminated from the hole. Failure to do so may cause the wood to split.

Add the second shelf in the same manner. Cut the back stops from ½-inch pine and install with screws from the rear. The compartment is also made and added at this time. Screws are driven from the rear where the heads won't show.

The drawer is of simple construction. It is made with an overlapping front. Two pieces of ½-inch lumber are used to make up the front panel. Before assembling the front, shape the edge as desired. A bead cutter used the same shape as the one used for the top, only of smaller size. The side guides are installed with about 1/16-inch clearance between the drawer sides. A small block of wood at the rear of the drawer serves as a kicker and prevents the drawer from tipping when fully extended. It also serves as a stop. It is installed from the bottom opening after the drawer is in place. The pulls are added to complete construction.

Finish the unit with stain and shellac or you may want to try an antique finish. Try a red latex base topped with a dark brown glaze.

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Decorative Bookshelf/ Table

SIMPLE IN DESIGN and construction, this unique bookshelf/table in brightly finished walnut is made of prefinished wall panels and molding. This eliminates one of the biggest headaches in furniture finishing. Not only is that tedious operation bypassed, but sanding is eliminated since all exposed edges and surfaces are prefinished.

To most craftsmen, the finishing operation is a necessary evil. And this is especially true when working with open-grained woods which must be filled, sealed, stained, lacquered, rubbed, and waxed. But this is all done before you even start this project, and it's no ordinary finish either. Scientifically applied, the finishes of better panels are similar to those found only in the top grades of furniture. So with half the battle over, you should have no trouble building this attractive contemporary piece.

Costs will vary depending on the panels and molding you use. The table shown was built for very little using a panel of Java walnut with a birch inlay. The panel is grooved, with 16 inches between grooves. The birch strip is only 1 inch wide so little is wasted when ripping the panels. The top is made by joining two sections with a butt joint. If care is used, the joint will be almost invisible. If a one-piece top is desired, a Weldwood flush panel may be substituted. Such panels are higher in price, however. Manufacturers offer a choice of woods.

The prefinished panels are only ¼ inch thick so they must be supported by a heavier wood such as ½-inch fir plywood. This is ideal as the total thickness of ¾ inch is compatible with the stock molding.

To simplify construction, cleats are used throughout the assembly. This eliminates the need for dadoes and rabbets. It also cuts down on the tools needed. A saw, drill, and screwdriver are sufficient.

Start the construction with ripping of the prefinished panel. Cut away the

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Fig. 18-1. Using cleats throughout the assembly of the unit not only eliminates the need for rabbets and dadoes, but also cuts down on the number of tools required in the construction.

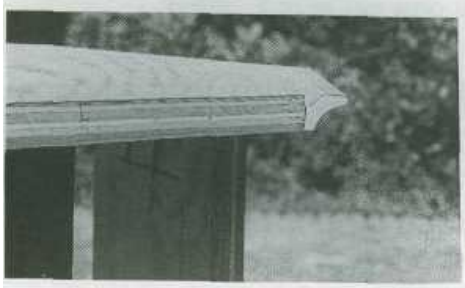

Fig. 18-2. In this view, the top section is lying upside down and a strip of cove molding has been attached to one of the octagonal sides. The ends of the molding are cut at 45-degree angles.

Fig. 18-3. Because there are so many pieces which look alike, it's a good idea to write an identifying number on the various sections to be joined together, thereby avoiding confusion.

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Fig. 18-4. Here the panels are shown in various stages of assembly. The ¼-inch prefinished stock is laminated to the ½-inch plywood backing before the octagonal opening is cut out.

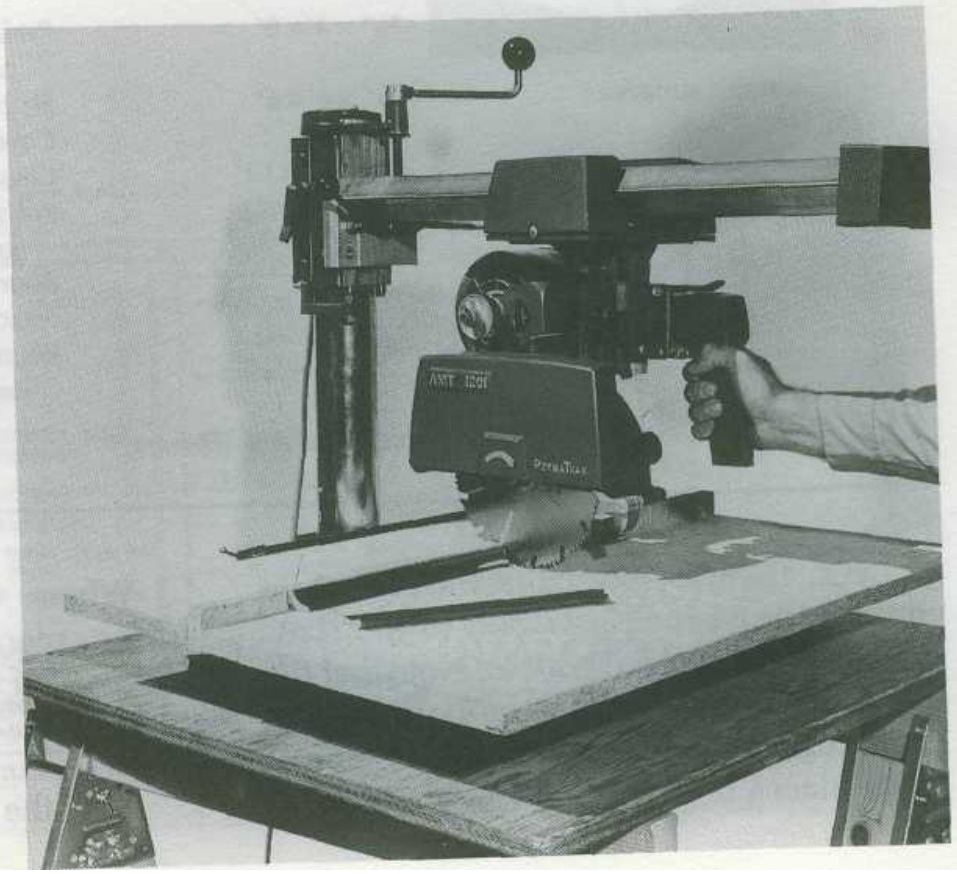

Fig. 18-5. A radial arm saw can greatly simplify the work of trimming and bevel cutting. Use a sharp blade and be sure to check bevels on scrap wood before cutting the prefinished work.

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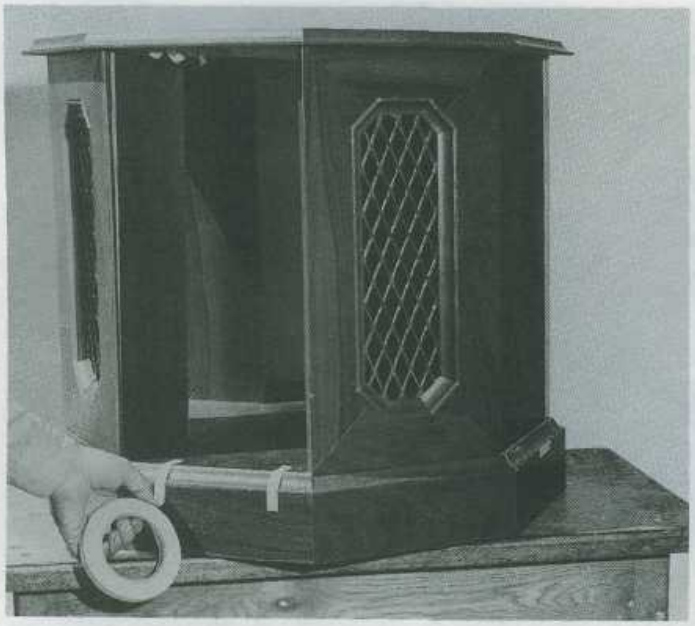

Fig. 18-6. An easy way to hold the moldings in place while the glue sets is to use masking tape, as shown. It's a good idea to first check the fit of all parts before applying the glue.

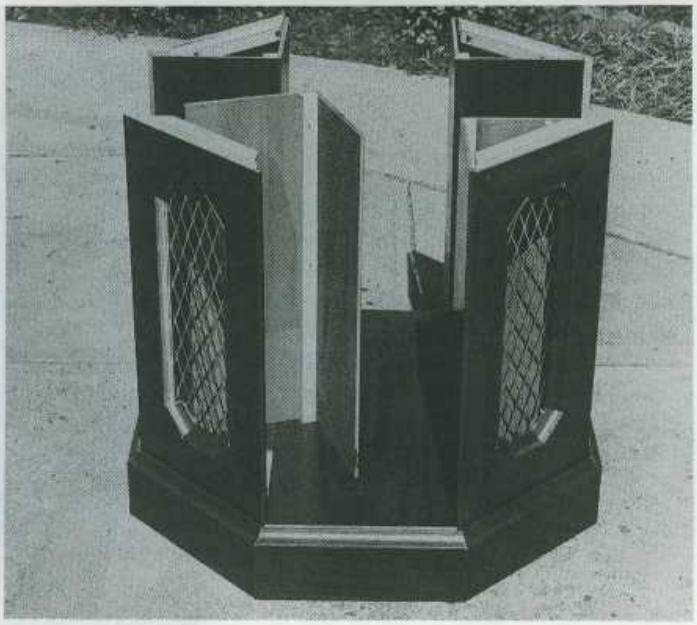

Fig. 18-7. Partially assembled unit is shown here. Note how diagonals are squared off on the inside. Paint interiors flat black.

MATERIALS LIST

Purpose	Size	Description	Quantity
Outer surfaces	¼" × 4' × 8'	Prefinished plywood	1
Inner surfaces	½" × 4' × 4'	Fir plywood	1
	¾" × 30'	Cove molding	
	¾" × 1" × 12'	Cleats	
	6" × 15"	Polished brass grille	4
	1¼"	Round-head screws	as needed
	½"	Round-head screws	as needed

Note: You will also need, white glue and washers.

grooves, then set the panels aside while you cut the ½-inch plywood to the sizes shown for the top and bottom. Note that the top panel is larger than the bottom as it overhangs the sides slightly. The shape of these pieces is octagonal (see detail).

When taking measurements and cutting pieces, bear in mind that the thickness of the material is ¾ inches and not ¼ or ½. This can be confusing to the unwary.

With the top and bottom cut, make the

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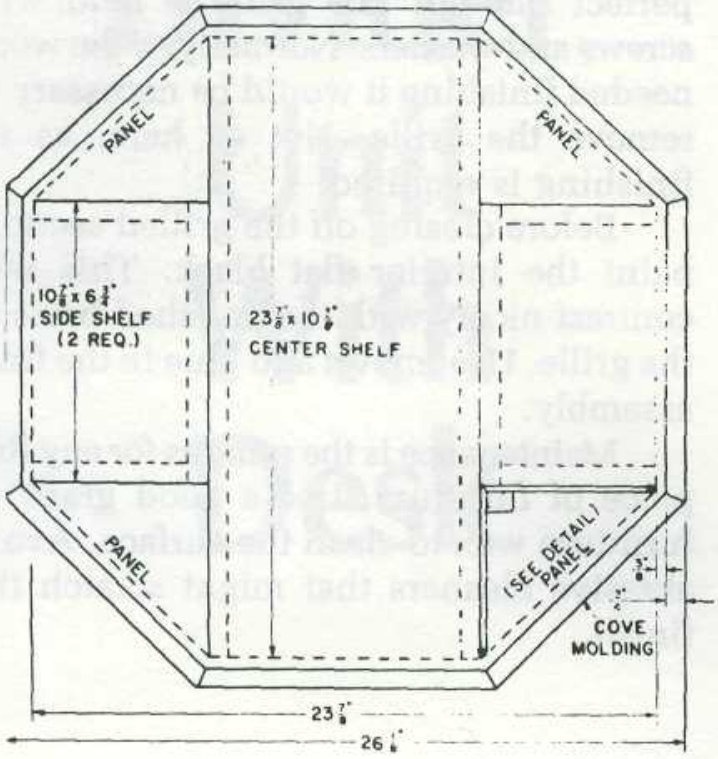

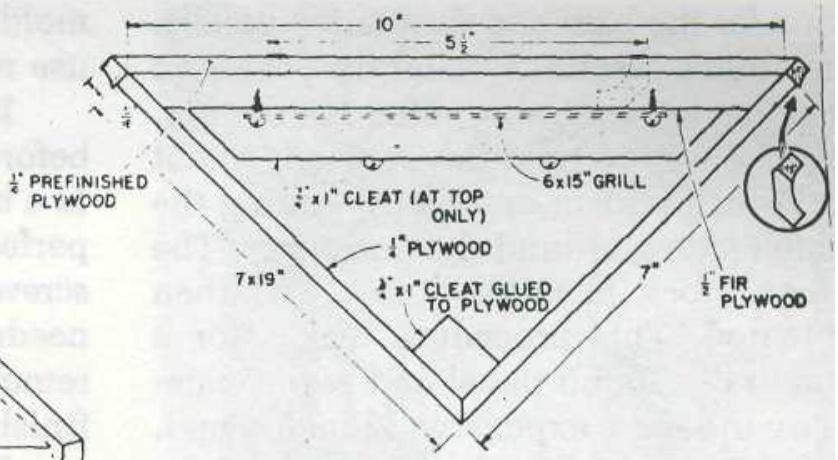

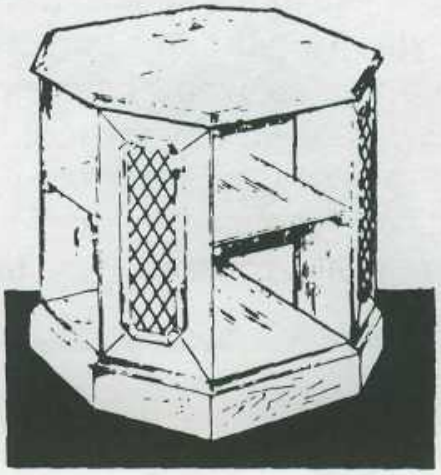

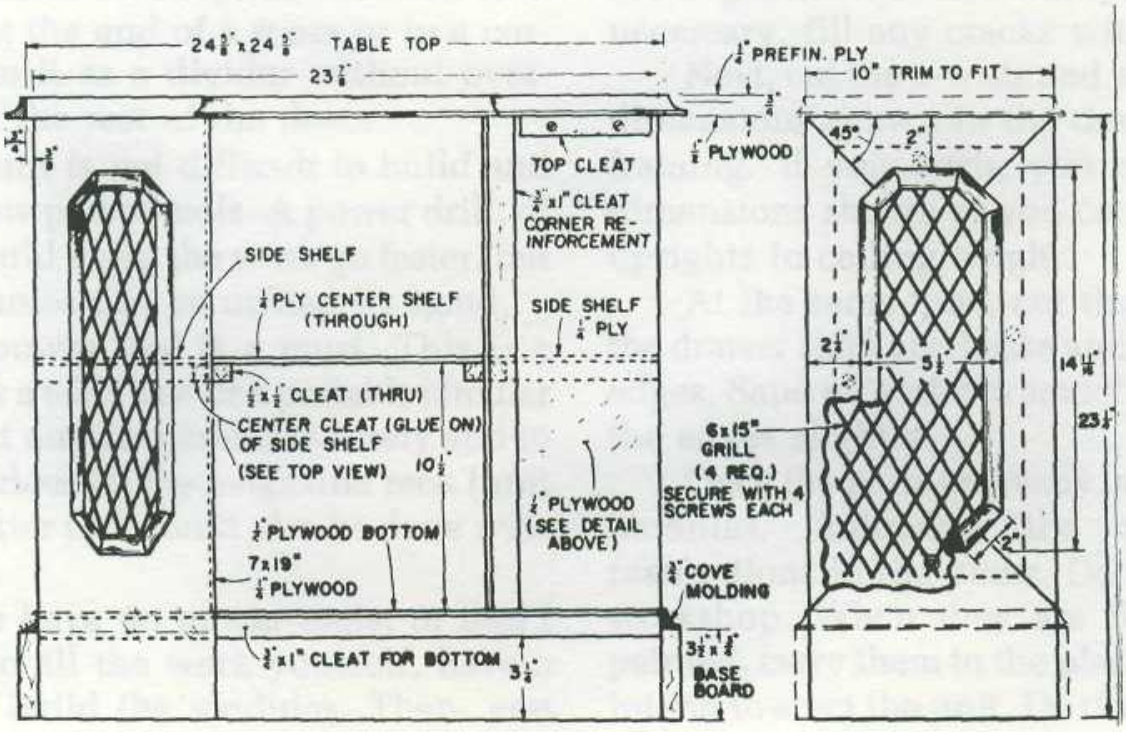

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strips for the base and decorative panels. Cut these sections slightly oversize allowing for trimming after laminating. The best way to treat the panels is to cut the ½-inch part in one piece, adding the ¼-inch facing around the perimeter. The ¼-inch stock is mitered first and then laminated. This procedure makes for a structurally sound panel and saves material on the more expensive ¼-inch panel. Use white glue when laminating and for all assembly work.

The radial arm saw greatly simplifies the work of trimming and bevel cutting. Use a sharp blade and be sure to check bevels on scrap wood before cutting the work. When trimming the molding cut the longest pieces first; this way if you make a mistake, you can recut for the next smaller size. An easy way to hold the moldings in place while the glue sets is to use masking tape, as shown.

It is helpful to install the metal grille before attaching the molding, as it serves as a backstop for the molding and assures perfect line-up. The grille is held with screws and washers. Normally, if the wood needed finishing it would be necessary to remove the grille. Not so here, as no finishing is required.

Before closing off the grilled section, paint the interior flat black. This will contrast nicely with the polished brass of the grille. Use screws and glue in the final assembly.

Maintenance is the same as for any fine piece of furniture. Use a good grade of furniture wax to clean the surface. Avoid abrasive cleaners that might scratch the finish.

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Divider Unit With Desk

THE OPEN, INFORMAL DESIGN of the combination desk and storage unit makes it attractive but unobtrusive. You can install it at the end of a room or in a corner, or use it as a divider without overwhelming the rest of the decor.

The unit is not difficult to build and requires few power tools. A power drill, of course would make the work go faster, but accurate holes can be drilled by hand.

One power tool is a must. This is a saw, either a table saw or a portable circular saw, to cut out the parts accurately and to cut the dadoes in the magazine rack (unit A). The latter task could also be done with a router.

If you have no power tools, or don't want to do all the work yourself, have a carpenter build the modules. Then, you can assemble the unit yourself.

Lay out the parts on plywood, as shown in the plans, and cut them out. True the edges with coarse sandpaper and, if necessary, fill any cracks with filler.

Next, cut the 2- × -2s and 1- × -4s to the dimensions shown in the drawing of the framing. If you wish, you can use the dimensions shown or you can extend the uprights to ceiling height.

At the same time, cut the 1- × -4s for the drawer sides and backs and for the table edges. Sand all surfaces smooth and round the edges slightly.

Once the parts are ready, assemble the modules, following the step-by-step instructions in the plans. Do this in your workshop. When they are finished and painted, carry them to the place where you intend to erect the unit. Do the same thing with the framing.

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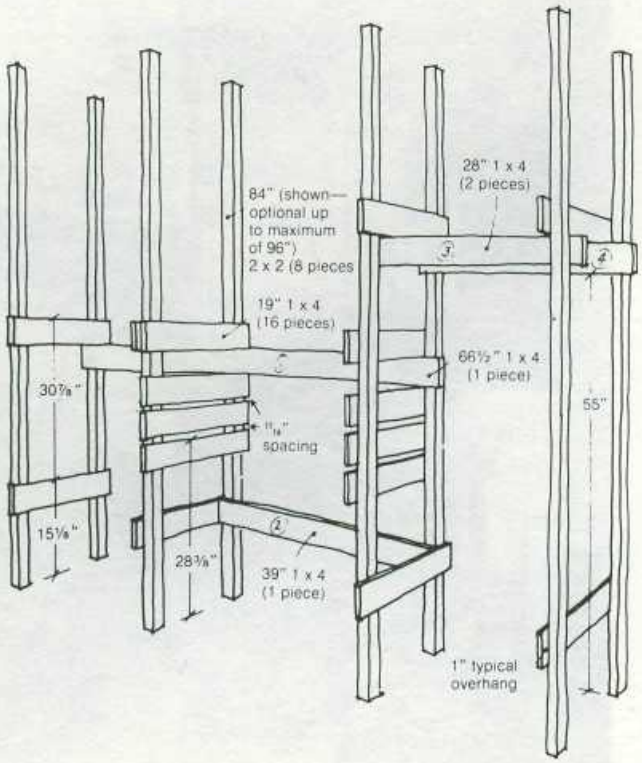
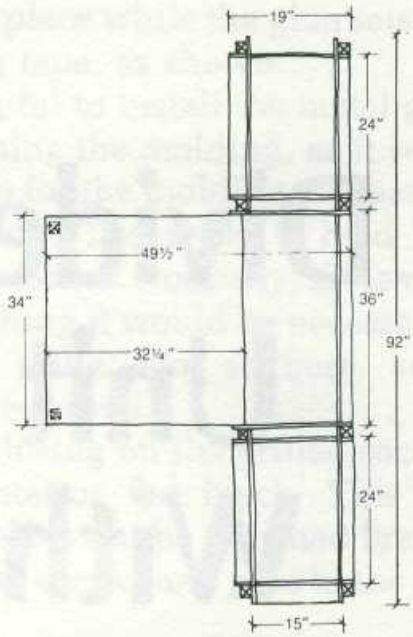
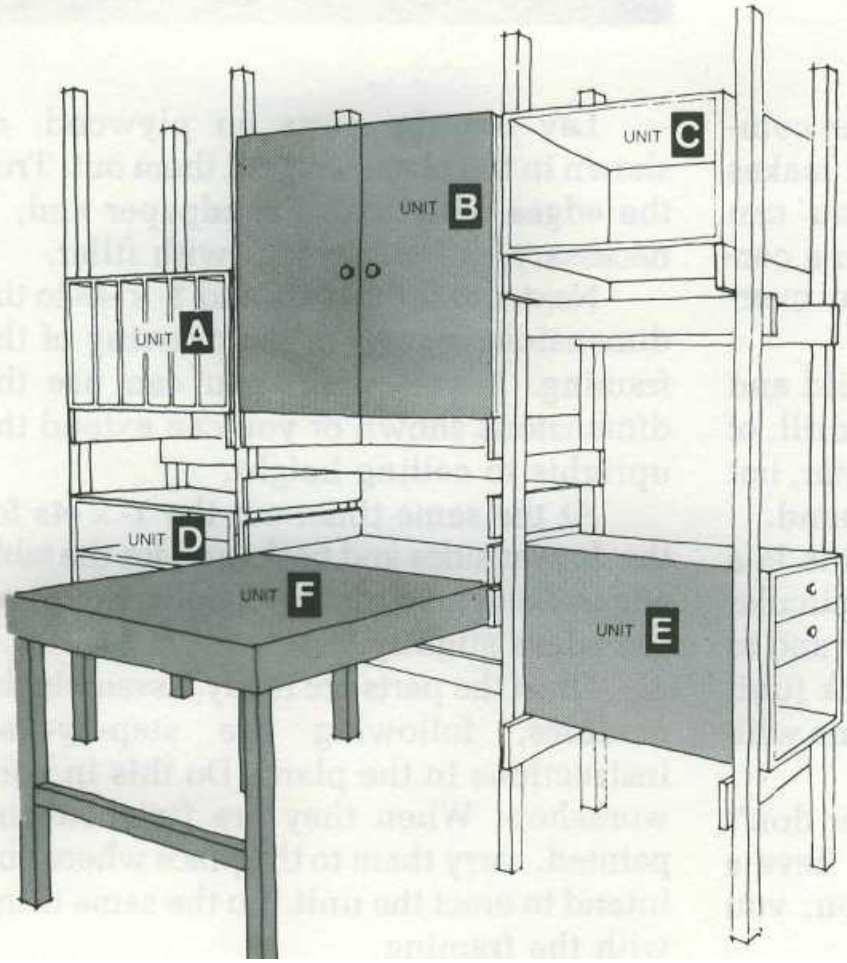
Stain or paint all framing members and allow to dry thoroughly, then move framing into room for assembly.

Predrill and screw together all 2 x 2 and 1 x 4 framing members, attaching members marked 1-4 last.

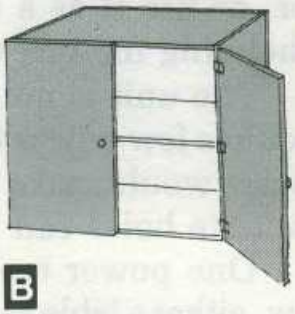




Set up desk as shown. To fold desk down, unlatch screen door hooks on legs, fold legs under and latch with screen door hook. Remove desk assembly from support framing and place assembly into channels directly above the previous channels. Desk top will fold down compactly without touching floor.



When thoroughly dry, install hinges on doors, and doors on cabinet; apply door pulls and magnetic catches.



UNIT B

Glue and nail basic cabinet parts together, including the shelf. Countersink nail holes before glue sets, and wipe away excess glue. Fill nail holes, allow to dry, and sand smooth.

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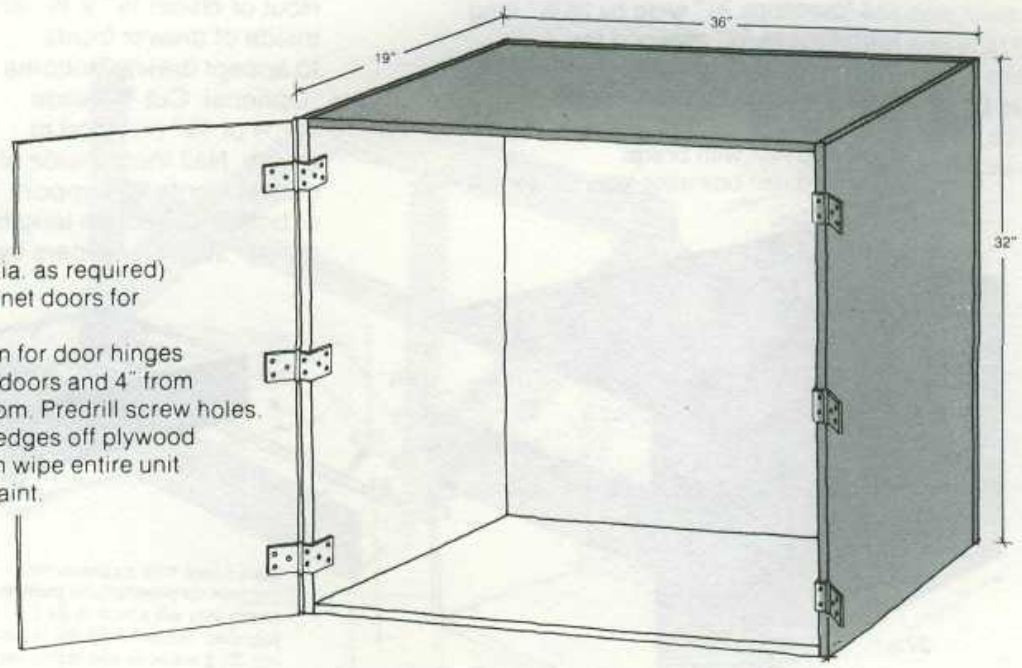
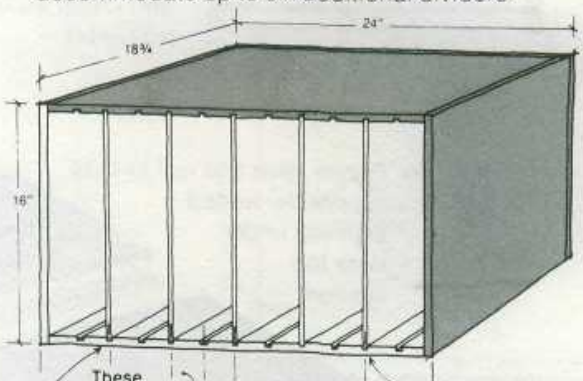


UNIT **B**

Drill holes (dia. as required) through cabinet doors for door pulls.
Mark location for door hinges on center of doors and 4" from top and bottom. Predrill screw holes.
Sand sharp edges off plywood corners, then wipe entire unit clean, and paint.

UNIT **A**

On top and bottom, rout or saw and chisel five ¼" x ¼" channels for dividers, spacing them as shown. (Note: six additional channels are shown as optional so dividers can be moved closer together or farther apart, or to accommodate up to six additional dividers.



Glue and nail basic parts together, then finish as described for Unit B.

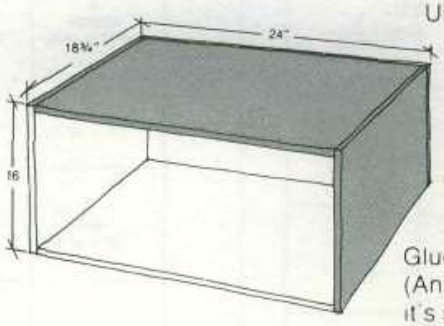
This "end" channel is centered 3½" in from edge.

These inside channels are 3⅝" centered.

These optional channels are 1¹³⁄₁₆" centered.

This "end" channel is centered 3½" in from edge.

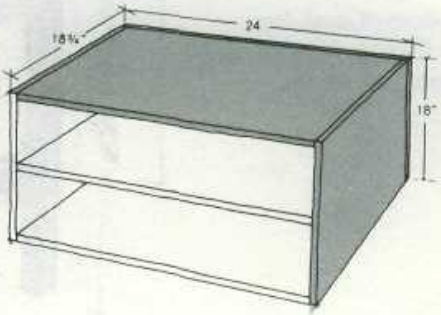
UNIT **C**



Glue and nail parts together. (An extra shelf may be added; it's shown on panel layout as optional.)
Finish as above.

UNIT **D**

Nail and glue parts together and finish as above.



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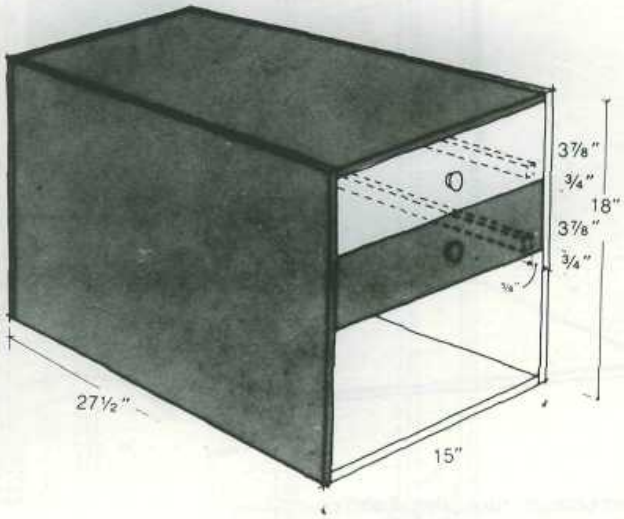
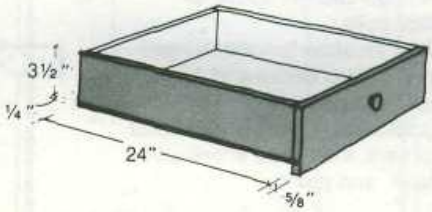
UNIT **E**

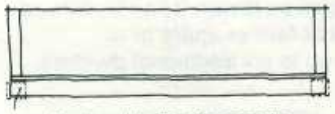
Cut four strips ¾" wide by 26½" long from excess ⅝" plywood for drawer support runners.
Mark their locations on insides of E sides.
Glue and nail with brads.
Glue and nail box assembly together.



Rout or chisel ¼" x ¼" channels inside of drawer fronts to accept drawer bottoms. (Optional: Cut ¾" wide strips of ⅝" plywood to length. Nail them inside of drawer fronts for support of bottoms. Reduce length of drawer support runners by ⅝".)



Mark screw hole locations (four per unit) on plywood unit modules where they will attach to 2 x 2 supports. Set unit modules in place, predrill into 2 x 2 supports and fasten securely



¾" runner fastened to E side panels.

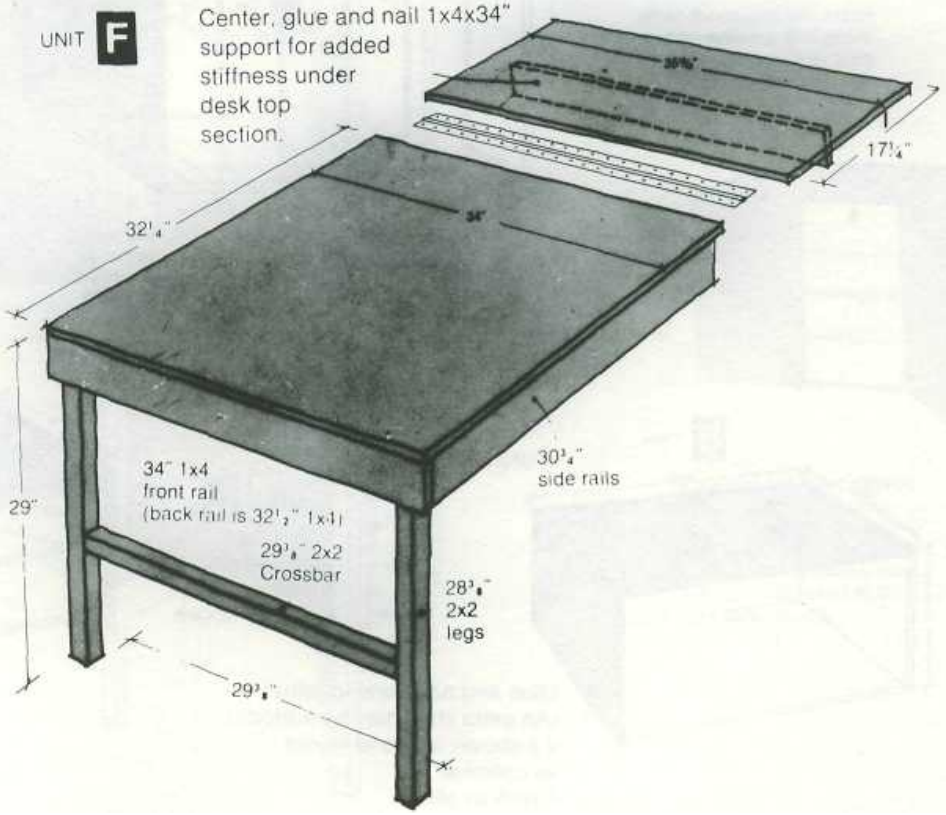
Drill holes for drawer pulls.
Nail and glue drawer assemblies, and finish as described for unit B.

UNIT **F**

Glue and nail 1x4's to bottom of desk at front, sides and back.
Make ¼" bevel on ends of legs opposite the side on which hinges will be installed.
Install butt hinges to both legs.
Pre drill and countersink holes in both legs for 2" flat head screws and attach 2x2" cross piece. Fill holes, allow to dry, and sand smooth. Then fasten hinged legs to bottom of desk top.

Fasten bottom of desk top section to folding desk top with piano hinge, and finish as above.

Center, glue and nail 1x4x34" support for added stiffness under desk top section.



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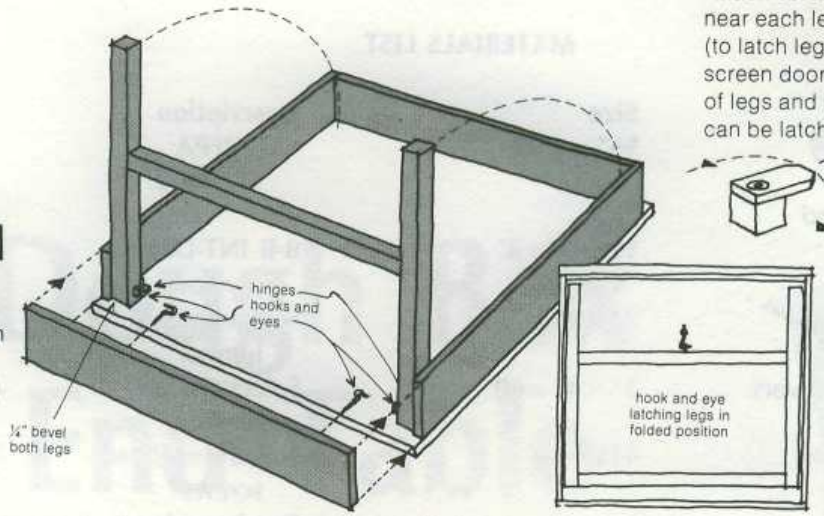
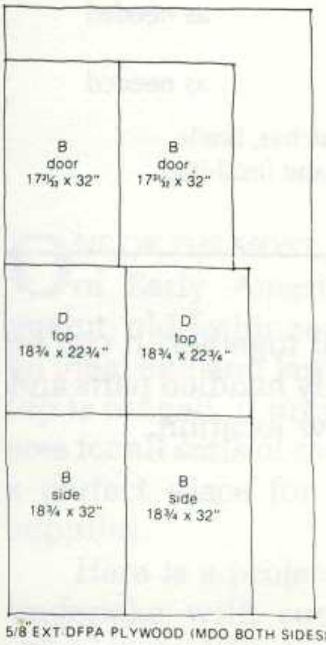
Attach screen door hook to inside of desk near each leg, and attach eye to each leg (to latch legs in open position). Also attach screen door hook and eye to cross piece of legs and bottom of desk (so legs can be latched in folded position).

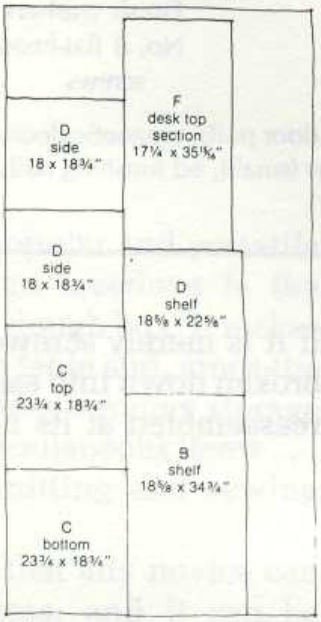
alternate latch to hold legs in folded position. 2x2x2" block (glued to bottom of folding desk top) with piece of plywood screwed into block. Use washers on both sides of plywood.

UNIT F





5/8" EXT DFPA PLYWOOD (MDO BOTH SIDES)



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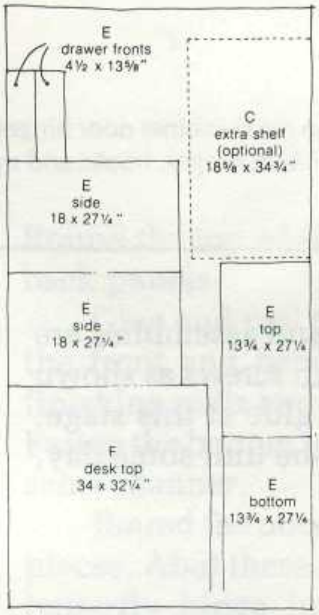
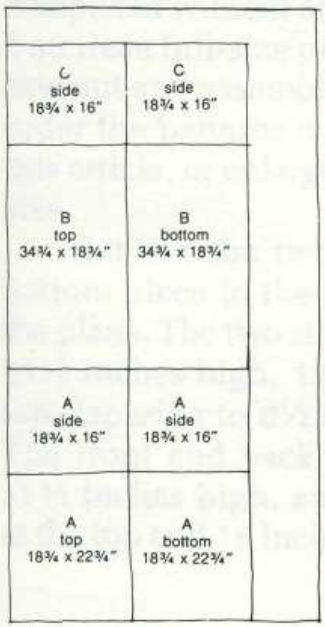


5/8" EXT DFPA PLYWOOD (MDO BOTH SIDES)

Most of the unit is made from plywood. Drawings at left give suggestions for making various cuts



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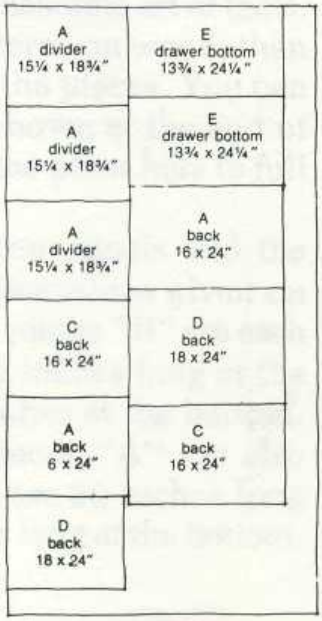
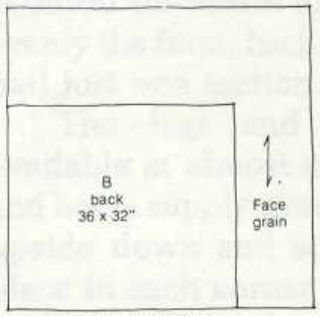


1/4" B-B INT DFPA PLYWOOD



1/4" B-B INT DFPA PLYWOOD

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MATERIALS LIST

Purpose	Size	Description	Quantity
Cabinets, shelves	5/8" × 4' × 8'	EXT-DFPA plywood	4
Dividers, backs, and drawer bottoms	1/4" × 4' × 8'	B-B INT-DFPA plywood	1½
Frame and desk legs	2" × 2" × 72'	Select-grade lumber	1
Frame and desk drawers	1" × 4" × 60'	Select-grade lumber	1
	1¼"	No. 8 oval-head screws	as needed
		Finish washers	as needed
	2"	No. 8 flat-head screws	as needed

Note: You will also need cabinet door hinges, door pulls, magnetic door catches, brads, piano hinge, butt hinges, hooks and eyes (small), 6d finishing nails, and finishing materials.

When all the parts and assemblies are on site, erect the unit with screws as shown in the plans. Don't use glue at this stage. You may wish to move the unit some day. If it is merely screwed together, it can be broken down into easily handled parts and reassembled at its new location.

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Dough Box End Table

ONE OF THE MOST popular and versatile of Early American creations is the quaint, old-fashioned dough box. It makes an ideal end and lamp table and, since the top is hinged, it provides a roomy storage area for all sorts of miscellaneous items . . . a perfect place for knitting and sewing supplies.

Here is a project that any novice can undertake with success, and it can be completed without an elaborate set of tools. You trace full-size patterns on wood, then saw out and assemble the pieces. You can order the patterns as shown at the end of this article, or enlarge the plans here to full size.

Cut out the two top panels and the bottom piece to the dimensions given on the plans. The two side pieces "B" are each 11½ inches high, 12½ inches long at the top, tapering to 8½ inches at the bottom. The front and back pieces "A" are also 11½ inches high, and are 20 inches long at the top and 16 inches long at the bottom. Round the top edges of the front, side and back panels.

Glue and nail the end pieces between the front and back panels. Use 3-penny finishing nails and countersink the heads. Fasten the bottom in place as shown, in the same manner.

Round the outside edges of the two top pieces. Abut these together and install the butterfly hinge in the center. Carefully position the entire top so that it overlaps evenly the front, back and side pieces, then nail just one section in place.

The legs and their brackets are available at almost all hardware, lumber and home supply stores. Turn the assembly upside down and screw the brackets in place in each corner so that the legs will project outward from the corners. Then screw the legs into place.

Cover all nail heads with wood putty, and sand smooth. Finish by staining the unit as desired, and follow with at least two coats of a good varnish or similar coating.

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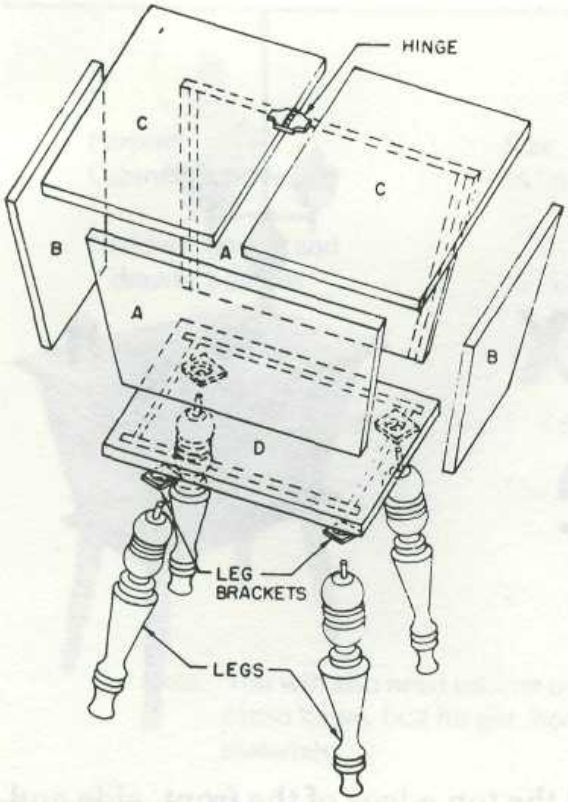

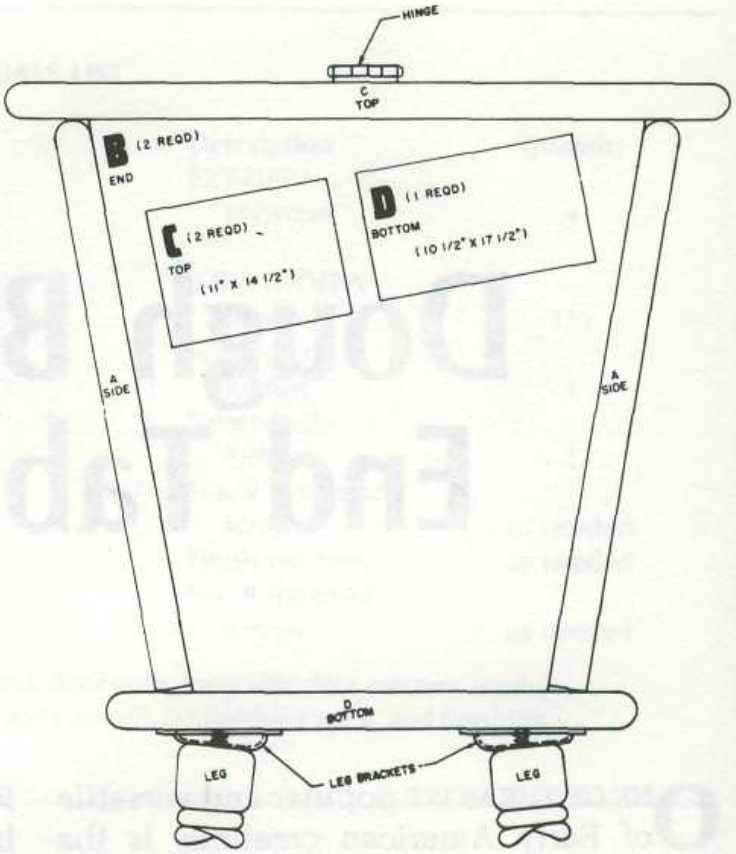

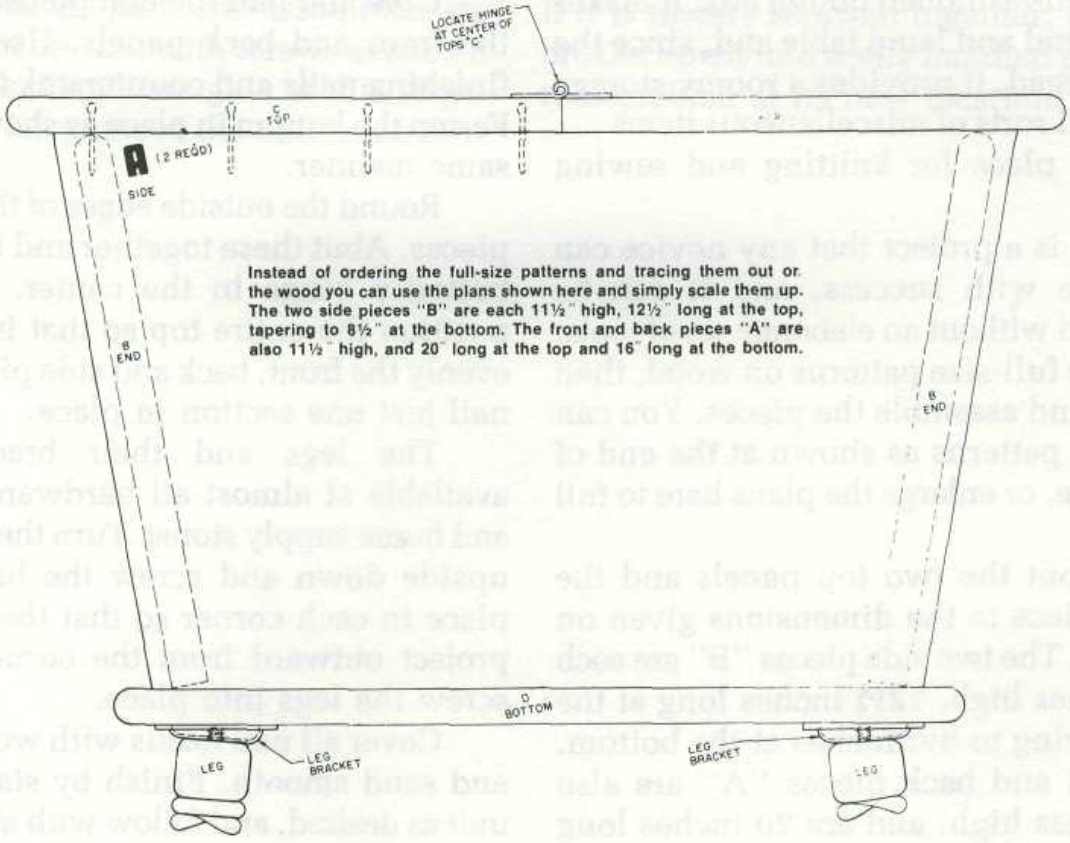

Instead of ordering the full-size patterns and tracing them out or the wood you can use the plans shown here and simply scale them up. The two side pieces "B" are each 11½" high, 12½" long at the top, tapering to 8½" at the bottom. The front and back pieces "A" are also 11½" high, and 20" long at the top and 16" long at the bottom.

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MATERIALS LIST

Purpose	Size	Quantity
Sugar pine, smooth 4 sides	1" × 12" × 10"	1
"Gerber" colonial-type legs	12" long	4
Butterfly-type mounting hinge		1
No. 10 wood screws	5/8"	24
Nails	3-penny	1/4 lb.

Sand lightly between coats. A semigloss finish is recommended.

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Durable Butcher Block Table

THIS STURDY butcher block table will make a fine addition to any kitchen. The end-grain maple top will withstand years of chops and cuts, and its simple lines will fit into any decor. Commercial butcher blocks are usually made 12 inches thick and weigh about 250 lbs.—far too heavy for home use. Ours is made with a dual-thickness top and weighs about 60 lbs. The perimeter blocks are 4 inches thick; the internal blocks are 1½-inch thick. We also added a small drawer to hold knives and other utensils.

The tabletop consists of 82 pieces of end-grain red maple, cut from ¾ stock. The ¾ stock (2 inches) has a dressed thickness of 1¾ inch. The technique used calls for some of the blocks to be precut to the finished size before gluing. This greatly simplifies the layout and arrangement of the blocks when alternating the annular rings. However, you may be wondering how as many as 11 pieces can be glued successfully. The trick is to use double-pointed brads. Without the use of these brads, it would be almost impossible for the average home workshopper to accomplish such a job.

Select good flat lumber then set the table saw at $2^{13}/_{16}$ inches and rip enough stock to produce 32 pieces, each 4 inches long. Be sure the fence is set parallel to the blade as any discrepancy now will show up in the finished top later on. These 32 blocks will make up the outer perimeter of the top.

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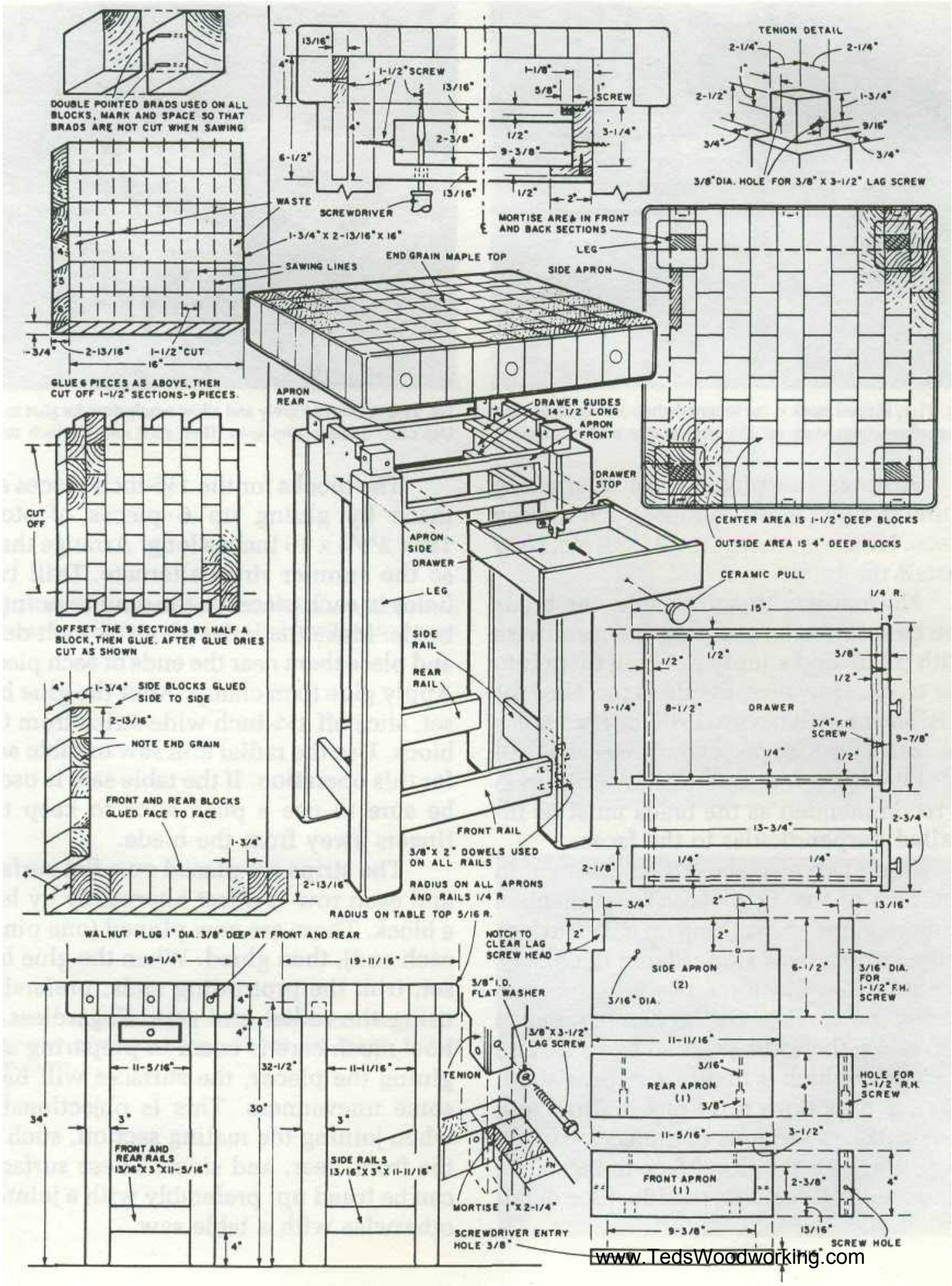

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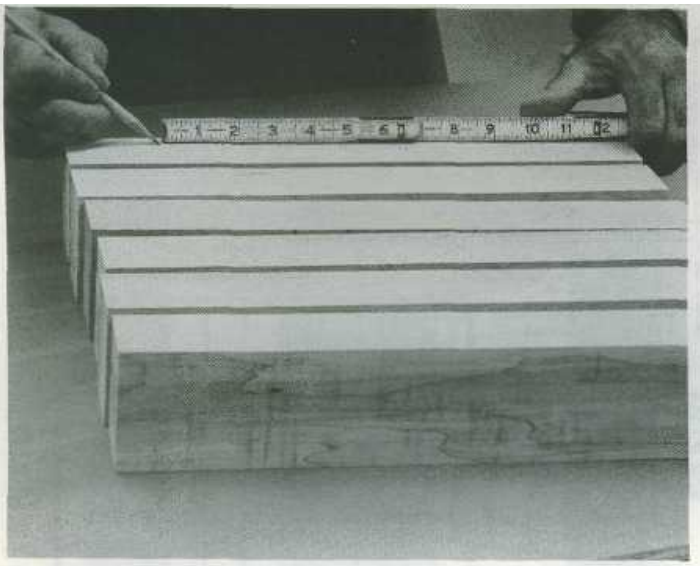

Fig. 21-1. Ripped stock is cut to length then arranged, annular rings alternating. Mark off 1½-inch lengths and kerf cuts.

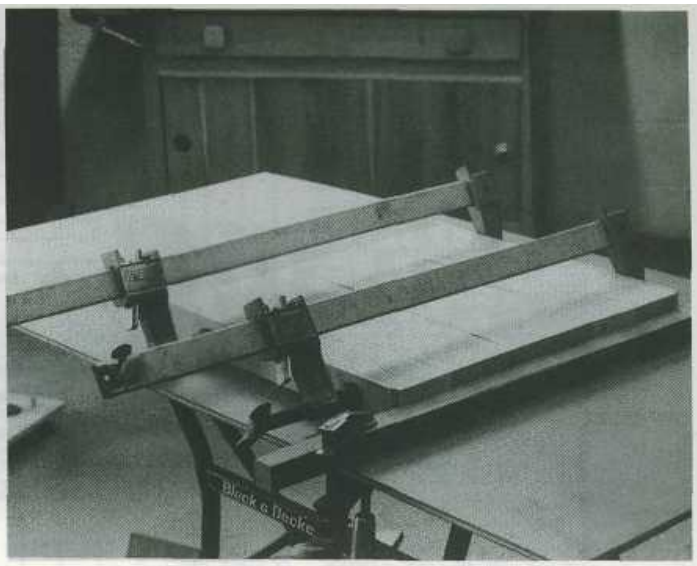

Fig. 21-2. Clamp securely and allow ample time for glue to set. Use cauls under clamp jaws. Then slice into 1½-inch strips.

Arrange the pieces with alternating annular rings, then number each mating piece. Number them 1-1, 2-2, 3-3, etc. Now install the brads.

Normally with soft woods, the brads can be inserted by grasping them endwise with pliers and simply pushing them into the work. However, maple is too hard for this, so you will have to drill the brad holes into one face. Use one of the brads as a drill by chucking it into your drill. A drill press is recommended as the brads must be installed perpendicular to the faces.

Insert two pins about 2 inches apart in one face of the 11 pieces. Keep them in numerical order, working on a flat surface and against a back stop. Clamp the blocks (without glue) to force the pins into the mating pieces. Remove the clamp, separate the pieces, then add glue and reclamp. Use resin glue which is highly water-resistant. Make two sections of 11 pieces (front and rear) and two sections of 5 pieces (sides). The 11 pieces are glued face-to-face. The 5 pieces are glued side-to-side. (See detail drawing).

The blocks for the 1½-inch pieces are made by gluing up 6 pieces of stock 1¾ × 2 13/16 × 16 inches long. Arrange these so the annular rings alternate. Drill two holes in each piece for the double-pointed brads. Make the holes about ¼ inch deep and place them near the ends of each piece. Apply glue then clamp. After the glue has set, slice off 1½-inch wide strips from the block. Use the radial arm saw or table saw for this operation. If the table saw is used, be sure to use a push stick to keep the fingers away from the blade.

The strips are placed on a flat surface and each row is offset alternately by half a block. These are now pinned (one pin at each end), then glued. When the glue has set, trim the protruding ends, preferably using the radial arm saw. Regardless of how much care is taken in preparing and gluing the pieces, the surfaces will have some unevenness. This is objectionable when joining the mating section, such as the front, rear, and sides. These surfaces can be trued up, preferably with a jointer, otherwise with a table saw.

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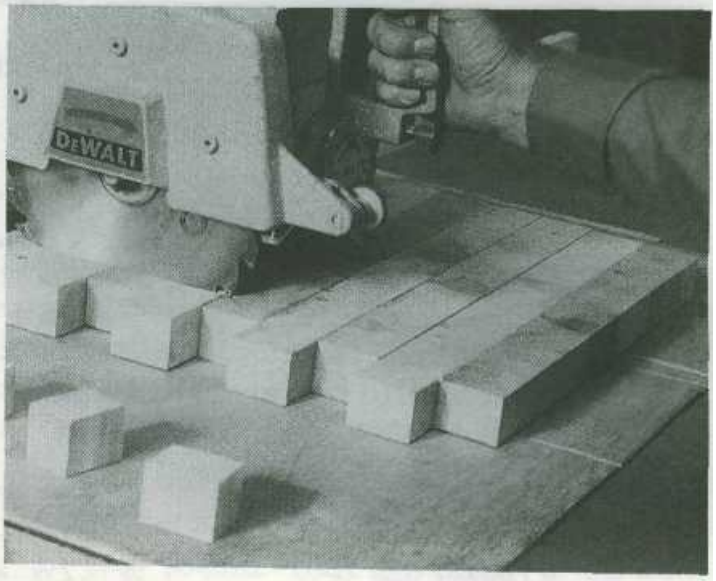

Fig. 21-3. Arrange 1½-inch strips, stagger joints. Double-pointed brads go in each end of face pieces. Trim block with radial saw.

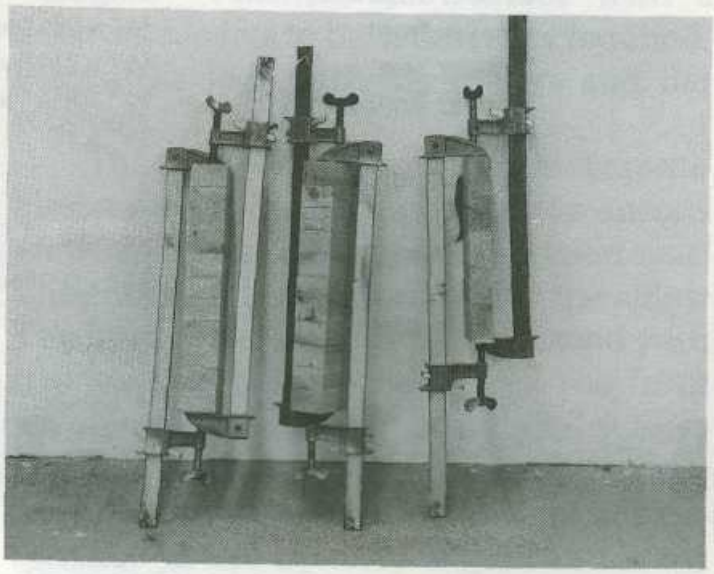

Fig. 21-4. Cut perimeter blocks at saw fence using stop clamp. Arrange for best grain appearance and number. Allow to set.

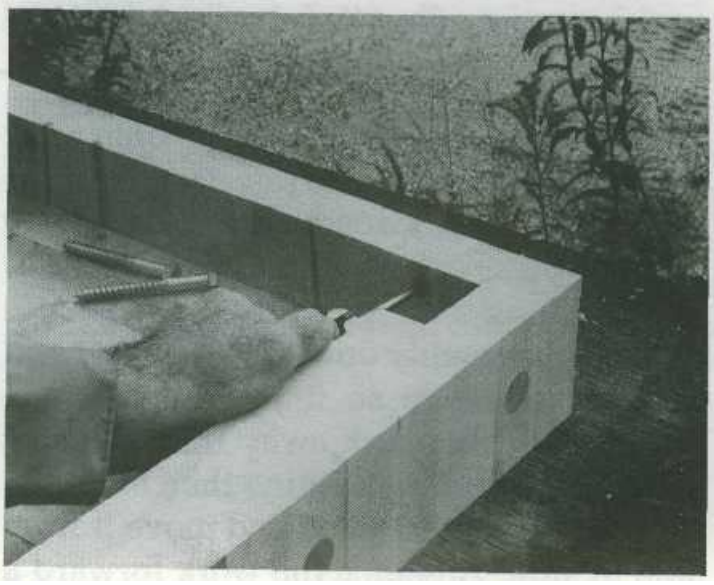

Fig. 21-5. Mortise for legs is made with one-inch Forstner bit. Lag screw pilot hole made with red hot ¼-inch Phillips screwdriver.

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MATERIALS LIST

Purpose	Size	Description	Quantity
Block	1¾" × 2 3/16" × 4"	Maple	32
Block	1¾" × 2 13/16" × 1½"	Maple	50
Leg	3" × 3" × 32½"	Maple	4
Apron side	13/16" × 6½" × 11 11/16"	Maple	2
Apron front/rear	13/16" × 4" × 11 5/16"	Maple	2
Rail, side	13/16" × 3" × 11 11/16"	Maple	2
Rail, front/rear	13/16" × 3" × 11 5/16"	Maple	2
Drawer guide, side	1⅛" × 3¼" × 14½"	Pine	2
Drawer guide, top	½" × ⅝" × 14½"	Pine	2
Drawer guide, bottom	½" × 2" × 14½"	Pine	2
Drawer side	½" × 2⅛" × 15"	Poplar	2
Drawer subfront	½" × 2⅛" × 8½"	Poplar	1
Drawer front	⅜" × 2¾" × 9⅞"	Maple	1
Drawer rear	½" × 2⅛" × 8½"	Poplar	1
Drawer bottom	¼" × 8½" × 13¾"	Plywood	1
Plug	⅜" × 1"	Walnut	6
Drawer pull		(No. 71002)	1
Lag screw	⅜" × 3½"		8
Flat washer	⅜" ID		8
Dowel	⅜" × 2"	(No. 51017)	16
Double pointed brad		(No. 83007)	80
Screw	¾"	No. 8 FH	2
Screw	1"	No. 8 FH	12
Screw	3½" × 10"	RH	2
Brad	1" No. 17		8
Salad bowl finish		(No. 85006)	1 pint
Drawer stop		(No. 78015)	1

Note: If you have difficulty locating the items in parentheses, write to Armor Products, Box 445, E. Northport, NY 11731 and ask for free catalog.

Set the pieces to be trued up onto a flat surface, such as the table saw. Rest the ends onto ¼-inch plywood then clamp two chunky pieces of wood, one at each end, thus forming a bridge as shown in photo. Place the assembly onto the table saw and elevate the blade so it just touches the work. With the work away from the saw blade, turn on the machine then slide the "bridge" over the blade and move it from side to side. Advance the work forward a little at a time after each pass. If you find low spots, elevate the blade and repeat. Take only very small bites each time. When done, the surface should be as flat as your saw table.

The walnut plugs for the front and rear blocks are made with a 1-inch plug cutter. The holes for these should be made with a 1-inch Forstner bit. Apply glue to the walls of the hole, then insert the plug.

The final assembly of the top can now

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take place. Again, using double-pointed brads glue the sides to the top member. When the glue has set, add the front and rear sections.

The legs are made from solid stock, if available. Otherwise two or more pieces are glued up to make the required thickness. The finished size of the legs are 3 × 3 × 32½ inches. Assuming two pieces of 1¾-inch stock are glued up, resaw the pieces to obtain the 3- × -3-inch cross section. After sawing, use a jointer to smooth the surface. Otherwise, use a belt sander.

The top end of each leg is tenoned to fit the mortise which will be made at each corner of the top. There are various ways of making the tenon. The easiest way is to use the radial arm saw and make successive cuts on two surfaces. Be sure to clamp a stop to the fence for the first (2½ inches) cut. After the tenons are cut, drill the holes for the lag screws.

Use the router with a 5/16-inch rounding bit to round the corners of the legs. After rounding, locate and drill the ⅜-inch diameter holes for the rail dowels. Make the hole a trifle deeper than 1 inch to ensure that the joint closes fully. Use dowel centers to transfer the holes from the legs to the rails. Using spiral dowels, assemble the leg to the rails and be sure to note that the rails are used in pairs as the lengths vary.

The underside of the top is mortised at each corner to receive the tenoned legs. One simple method of mortising the end-grain makes use of a Forstner bit. This tool is ideal because of its ability to make overlapping cuts without "walking." Lay out the mortise lines, then drill out the waste area. Set the depth to cut 2½-inches deep. Clean out the mortise with a chisel.

Install the legs into the mortises then mark the hole centers for the screws. Remove the legs and drill the ¼-inch pilot holes. One hole in each corner can be drilled, but the second hole cannot be drilled because of the space limitations.

We found that heating a 79-cent "bargain" Phillips screwdriver with a torch enabled us to burn the holes required. Fasten the legs with lag screws and flat washers.

The aprons are cut, drilled, and assembled as shown. Note that the side aprons are deeper than those of the front and rear. They are fastened with screws at the sides. The front and rear aprons are fastened with two screws through the edges. The front apron or frame has two additional screws fastened at the ends.

The drawer and guides are cut and assembled as indicated. Use glue and brads to fasten the drawer members. The top is sanded with a belt sander followed by a finishing sander. Start with a coarse belt working down to 120 grit. Dust carefully, then use the finishing sander until the top is glassy-smooth.

The table should be finished with mineral oil or a good salad bowl finish which has been approved for contact with food.

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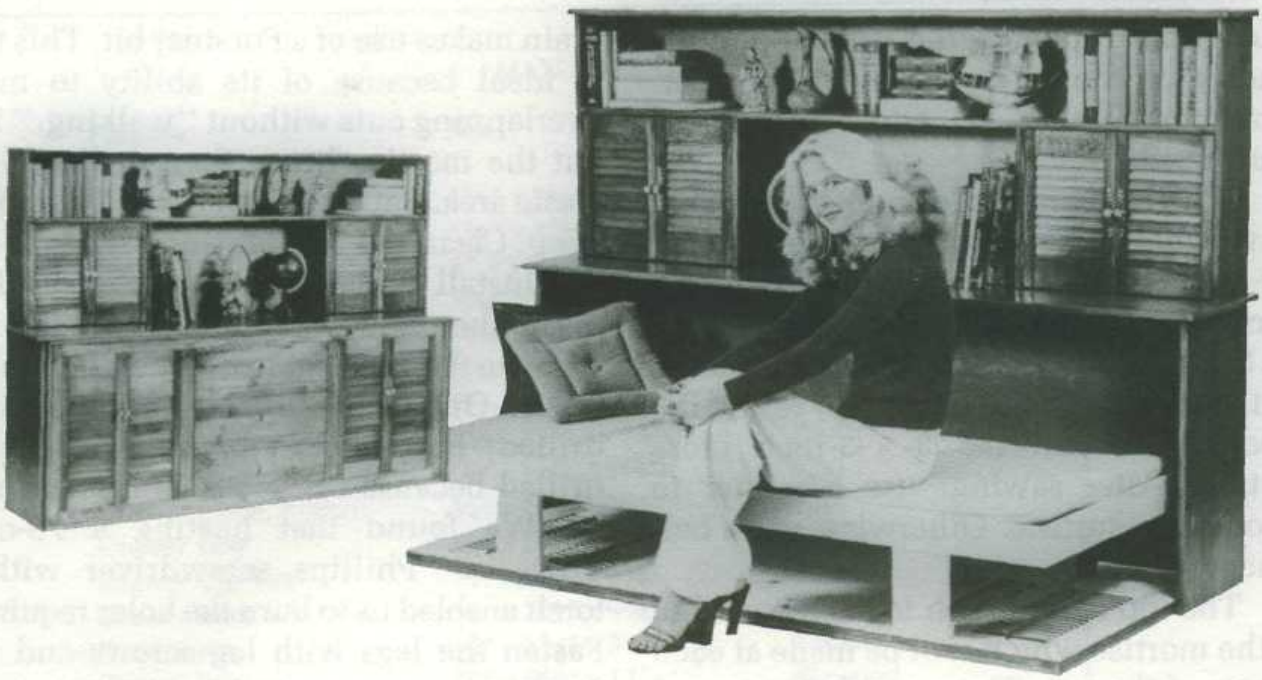

Foldaway Bed/Storage Unit

DO YOU NEED an extra bed or bookcase? Build this unit and you'll have both—a handsome storage unit and a comfortable bed. This is a modern version of the Murphy bed which was very popular at one time. The Murphy beds folded into a wall when not in use, and you may still see them occasionally on TV reruns of the old Laurel and Hardy films, with one comedian being accidentally slammed into the wall while still asleep.

With living space at a premium today, this unit should find wide acceptance among apartment dwellers and home owners alike. Because of its ease of operation, it takes little effort to convert from books to bed. Simply roll out the bottom section and tilt. It's a great idea for a small guest room. It occupies little space either open or closed, and it's attractive as well as useful.

The unit shown was made of pine plywood, but solid pine or other woods may be substituted. Construction has been simplified so that even the novice woodworker should have no problem in making the piece. No tricky cuts are involved, and butt joints are used throughout.

The piece consists of three parts: upper shelves, lower bed compartment, and the bed itself. The dummy doors and drawers

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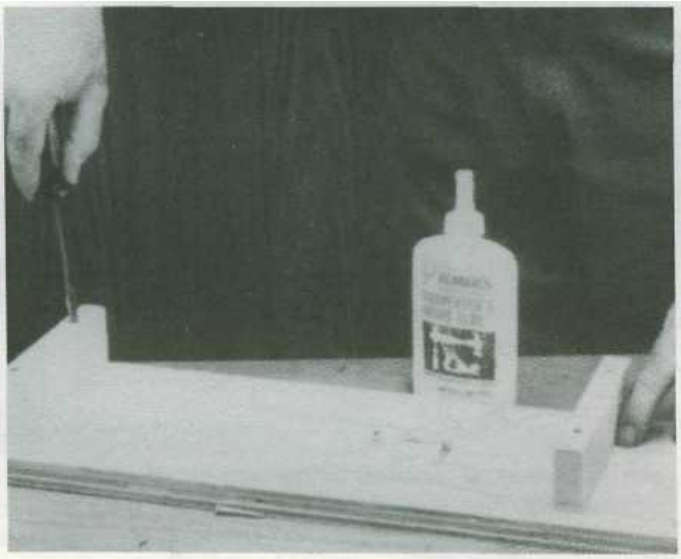

Fig. 22-1. The cleats used to fasten side members are 2 inches wide and receive 3/16-inch-diameter holes.

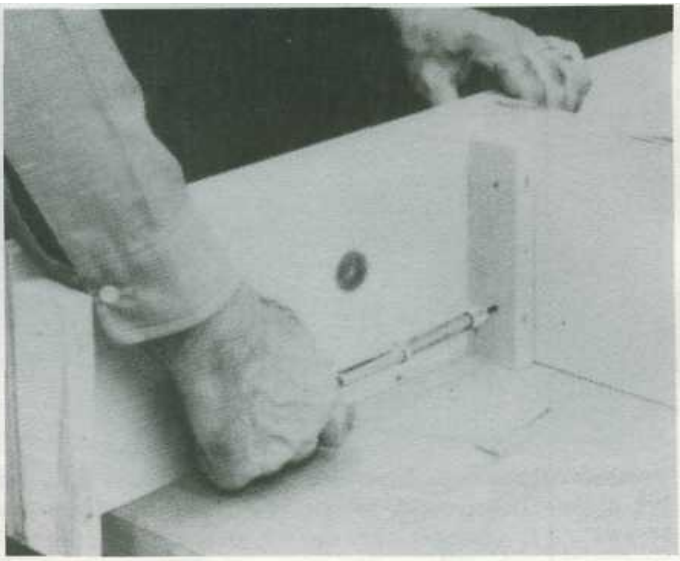

Fig. 22-2. Assembling the side to shelf. Push drill is handy for making the screw pilot holes.

are actually the base of the bed. The bed rides on specially designed non-swivelling casters. These are necessary because they ensure that the bed will roll in and out in a straight line. If conventional casters are used, it becomes very difficult to withdraw and replace the bed without striking the compartment sides.

In order to keep the knobs and pulls clear of the floor when the bed is in use, the edges of the front panel are thickened by the use of appropriate moldings.

The bed consists of a framework supported by four uprights. Crosspieces support a panel which, in turn, supports a camper-type mattress. The camper mattress is ideal since it is only three inches thick and measures 26½ × 70 inches. It remains in place even when the bed is closed or in the upright position. It is held with a pair of straps. A piece of foam of equal thickness may be substituted.

Before starting construction be sure to have the mattress on hand so that you can fit the parts to it. If the mattress you use differs in size, be sure to change the dimensions shown on the drawings accordingly. Although the area below the bed is open, it can be made with closed sides and bottom to provide additional storage space for blankets, sheets, pillows and the like.

If you choose to use solid boards, the top and side members may have to be glued up, unless you use pine, which is usually available in widths over 12 inches. Since the plywood panels measure 4 × 8 feet, you won't have to do any gluing. Assuming that you are using plywood, lay out and cut the top and side pieces of the compartment either on the table saw or with a portable saw. If you use the portable saw, be sure to use a guide strip to assure a straight cut. The strip should be fastened to the board with clamps, one at each end. The thickness of the strip is governed by the clearance under the saw. Except for some of the smaller trim saws, the guide strip can usually be of ¾-inch stock.

After the three pieces are cut, prepare the two cleats which will be used to fasten the top and side members. Cut the cleats two-inches wide and drill three 3/16-inch-diameter holes for the screws in each

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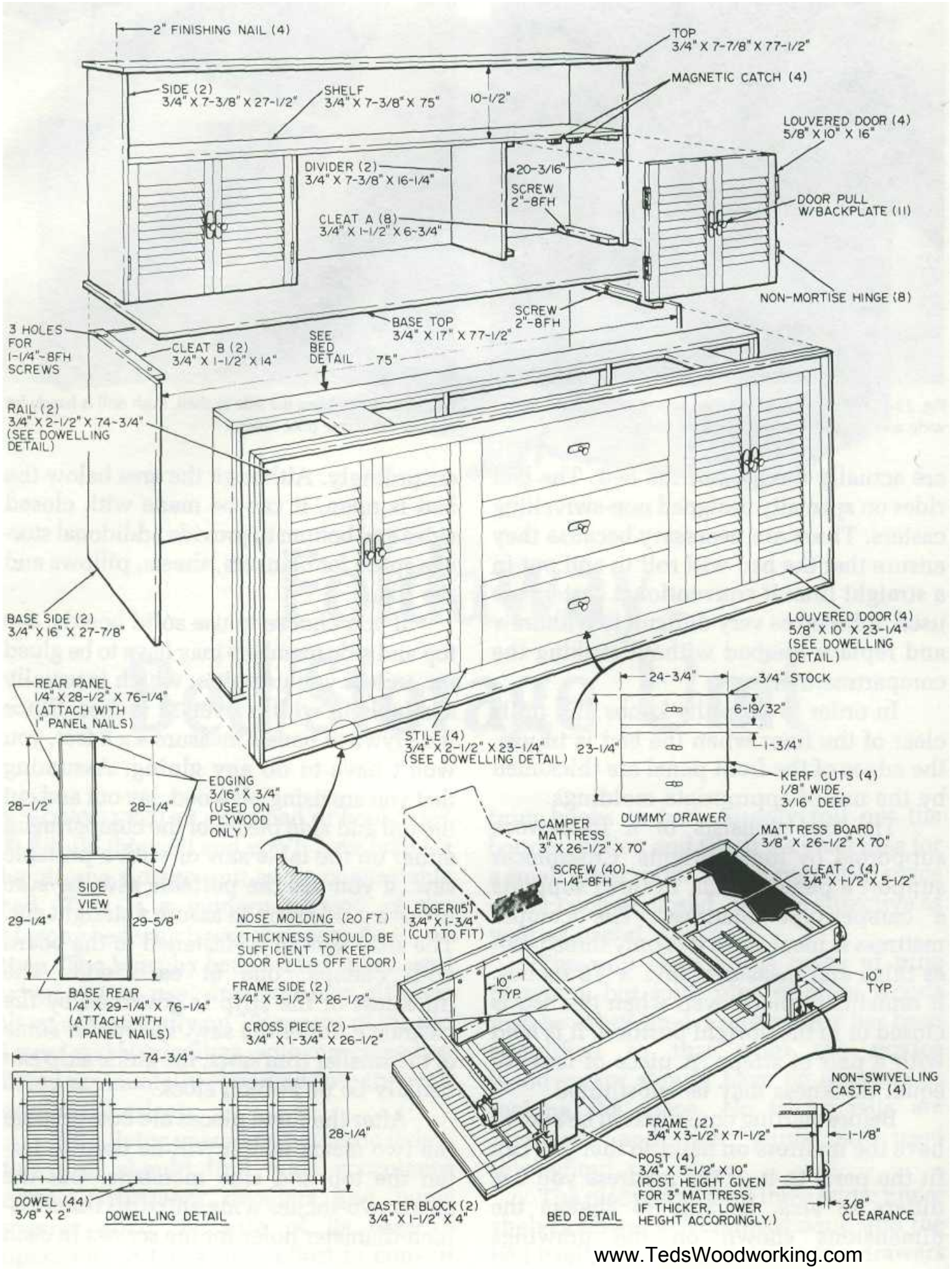

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Fig. 22-3. To locate position for dividers, set two doors side by side, make a mark on shelf edge even with door, another mark 3/16 inch from first indicates inside edge of divider.

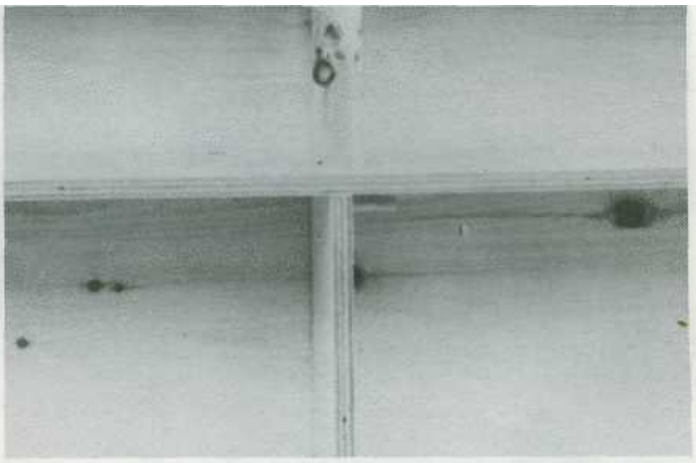

Fig. 22-4. When installing the rear panel, use a temporary spacer to keep the top board from sagging. When nailed in place, the rear panel will prevent the top from sagging.

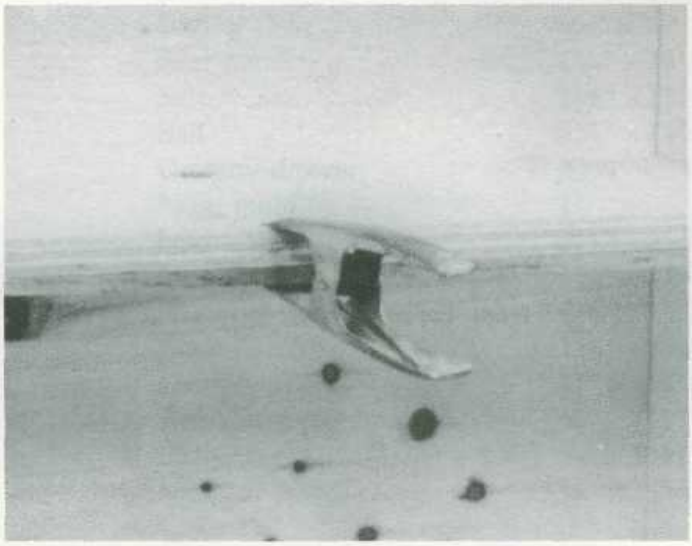

Fig. 22-5. To accurately position the dividers, use several wood strips, cut to proper length, to provide the correct spacing. Use a clamp to hold wood strip against the top.

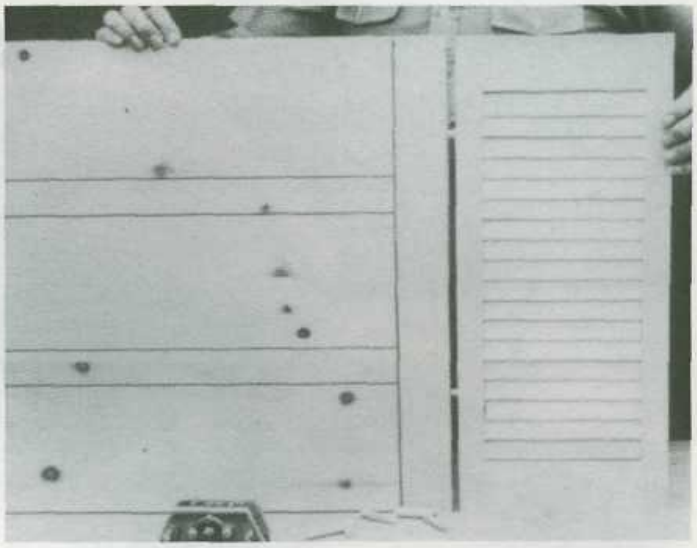

Fig. 22-6. Parts of the lower front section are installed with doweled joints. Two dowels are sufficient to hold louvered sections.

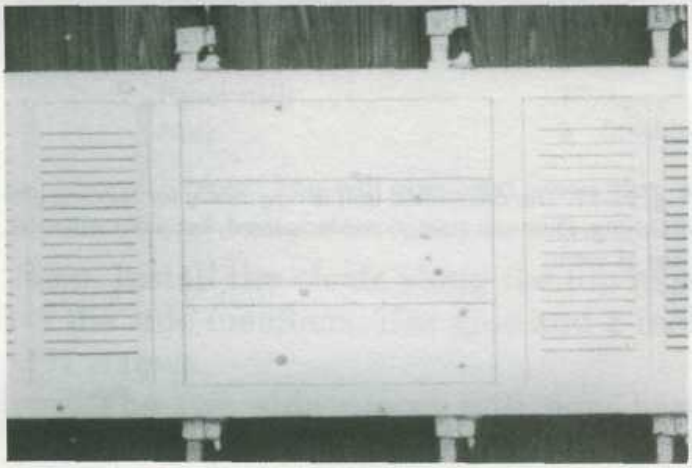

Fig. 22-7. Front panel consists of four louvered doors and center panel simulating three drawers. Add stiles, clamp entire assembly.

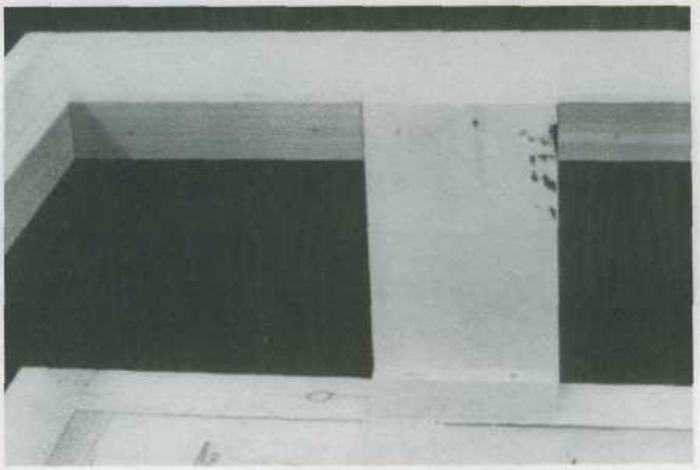

Fig. 22-8. The top of the bed post must be flush with the ledge strips. A 5½-inch cleat is used to mount the posts to the front panel.

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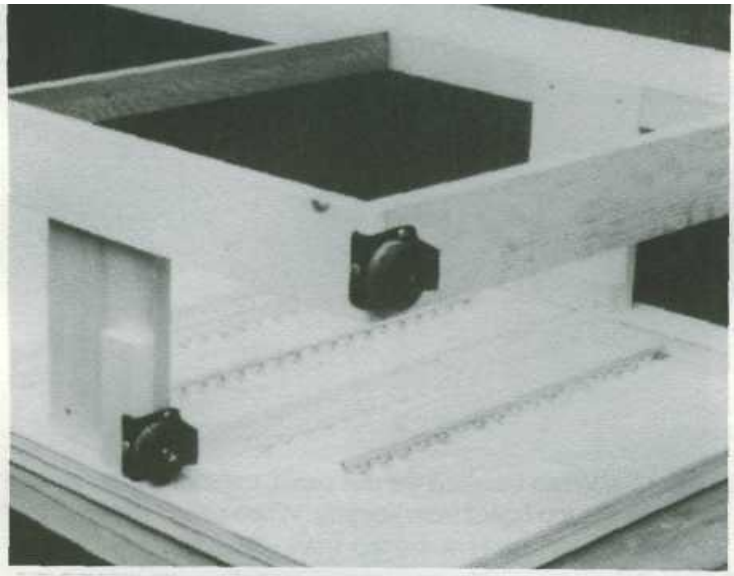

Fig. 22-9. Two of the casters attach to the bed frame. The other two casters attach to the posts by means of 1¼ × 4-inch blocks.

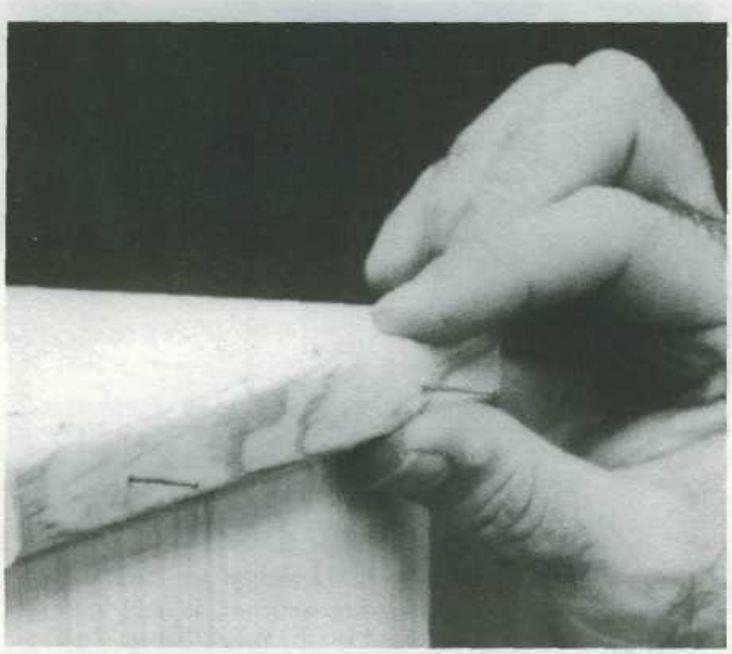

Fig. 22-10. Finishing off the plywood with 3/16 × ¾-inch edging. Use glue and brads. For best results, try mitering the corners.

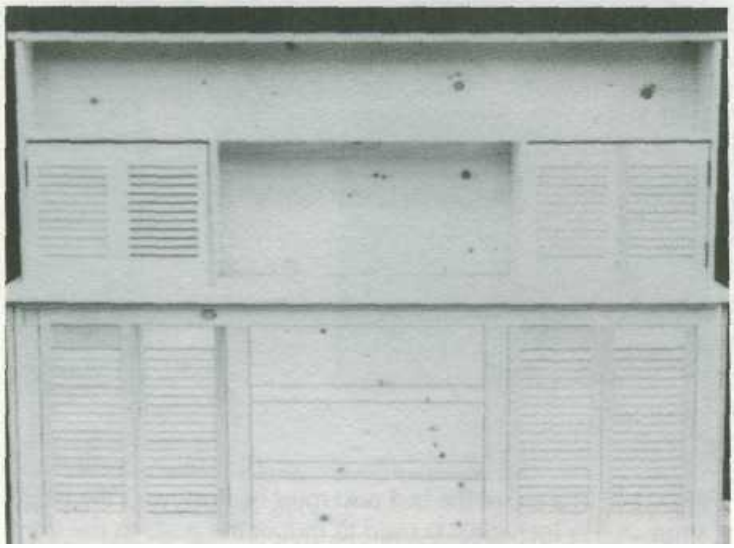

Fig. 22-11. The completed unit is now ready for sanding and finishing. Ours was stained and lacquered, but paint will work just as well.

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MATERIALS LIST

Purpose	Size	Description	Quantity
Base side	16″ × 28⅞″		2
Base top	17″ × 77½″		1
Base rear	¼″ × 29¼″ × 76¼″	Plywood	1
Cleat B	¾″ × 1½″ × 14″	Solid pine	8
Door	⅝″ × 10″ × 16″	Louvered	4
Top	7⅞″ × 77½″		1
Shelf	7⅜″ × 75″		1
Side	7⅜″ × 27½″		2
Divider	7⅜″ × 16¼″		2
Cleat A	¾″ × 1½″ × 6¾″	Sold pine	2
Door	⅝″ × 10″ × 24″	Louvered	4
Edging	3/16″ × ¾″		40′
Rear panel	1¼″ × 29¼″ × 76¼″	Plywood	1
Stile	2½″ × 23¼″		4
Rail	2½″ × 74¾″		2
Dummy drawer	23¼″ × 24¾″		1
Nose molding	1″		20′
Frame side	3½″ × 26½″		2
Frame	3½″ × 71½″		2
Post	5½″ × 10″		4
Cleat C	1½″ × 5½″	Solid pine	4
Ledger	¾″ × 1¾″	Pine	15′
Crosspiece	¾″ × 1¾″ × 26½″	Pine	2
Caster block	¾″ × 1½″ × 4″		2
Mattress board	⅜″ × 26½″ × 70″		1
Casters			4
Door pull with backplate			11
Magnetic catch			4
Non-mortise hinge			8
Dowel	⅜″ × 2″		40
Screw	2″—8 FH		24
Screw	1¼″—8 FH		40
Panel nails	1″		36
Nails	2″ finishing (for top panel)		4

Note: You will also need white glue, sandpaper, and finishing materials.

face. Install the cleats along the top edge of the side members. Use glue and 2-inch FH screws.

The two side pieces will now have cleats at one end. Put them aside and, while the glue sets, cut the rear panel. This should be ¼-inch plywood. However, since it doesn't show (except when the bed is in use), a less expensive wood, such as fir, can be used. This will help keep costs down. After cutting the panel to size, sand all edges and break the sharp corners. Use a piece of sandpaper wrapped around a block, or a power sander.

Now fasten the sides to the top. Position the sides so the top overhangs

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equally at both ends. Apply white glue to the joints then assemble with 1¼-inch screws. Before the glue sets, tip the U-shaped assembly forward so the rear edge is upright. Install the rear panel, noting that the lower edge is flush with the lower edge of the sides. The upper edge of the panel should be set back ⅜ inch at the top. The panel is also set back at the sides, but only by ⅛ inch.

Provided that the setbacks are equal at the sides, the assembly will be perfectly square because the rear panel acts like a large square. Fasten the panel with 1-inch panel nails. These are the nails used to install prefinished wall paneling: they are made with annular grooves and have excellent holding power. (Try removing one and you'll see how well they hold.) Use glue at all joints.

This is made as a separate unit which fastens to the base piece. The top, sides, shelf and dividers are of equal width. Set the fence of the table saw to 7⅜ inches and rip the required pieces, then cut them to the lengths shown in the Materials List. Cut the eight cleats to size and, as before, drill the screw clearance holes.

Install the cleats to the side pieces. Position them carefully, especially the upper ones which hold the shelf. The lower ones are fastened flush at the bottom. The cleats for the dividers are mounted flush at top and bottom.

Install the side pieces to the shelf first. Lay the shelf and ends on their backs and be sure to work on a flat surface. Apply glue to the joint, then screw the cleats firmly. To ensure that the assembly remains square, fasten a diagonal cleat to the back side as shown. Repeat the procedure for the opposite end. The top piece is added next. Center it so the overhang is equal at both ends and at the front.

To locate the position for the dividers, place two louvered doors side by side without space, as shown in the photo. Place a mark on the shelf edge in line with the door farthest from the side panel. Place another mark 3/16 inches from the first. This will indicate the inside edge of the divider. Cut and install the rear panel, then fasten the upper section to the lower.

Install the divider next. To simplify the installation, cut four strips of wood making the length equal to the width of the opening. Place two strips at the top and two at the bottom of the opening between the end panel and the divider. Mark the screw hole locations, apply glue and screw the pieces securely in place.

The doors are hung with non-mortise hinges. These are quickly installed since they do not require a gain to be cut in the door or side panel. The specially designed hinge automatically gives the proper clearance allowance between door and frame. Fasten the hinges to the door, then place into the opening, resting the bottom of the doors on a strip of ⅛-inch wood. Mark the position of the hinges on the frame (side panel and divider), then use an awl to pierce the center marks for the screws. Fasten the rest of the hinges and repeat for the other set of doors.

Drill a 3/16-inch-diameter hole in the center stiles of each door for the pulls. Also mount the magnetic catches to the underside of the shelf. Use one catch for each door.

The front panel for the bed is made with louvered doors and a center panel simulating three drawers. Make the center panel first. This should be equal in height to the doors. After cutting the panel to size,

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cut the double set of grooves representing the rails in between the drawers. Cut the grooves 3/16 inch deep. Drill the 3/16-inch holes for the pulls, then set the piece aside temporarily. Trim 3/4 inch from the door bottoms so they will measure 23 1/4 inches long.

Cut the rails and stiles to size, then lay them on a flat surface with the doors and dummy drawers in place. Be sure that the tops of the doors are oriented (Louvered doors have a top and bottom). With all the pieces aligned, mark a light gauging line on the face of each piece to indicate the dowel locations. Identify each stile with its adjacent part, for example, A-A, B-B, C-C, etc. If you don't, you'll have quite a job trying to match the various parts later on.

Drill 3/8-inch-diameter holes 1 inch deep for the dowels. A doweling jig is most useful for this operation. It will ensure straight holes perfectly centered and aligned. If you do not use a doweling jig, be sure that the holes are drilled exactly in the center of each piece.

When assembling the front panel install all of the stiles to the doors and drawer panel sides. If you use snug-fitting spiral dowels, you won't need to clamp the assembly. Likewise, you need not clamp the top and bottom rails. The width of the piece was assembled without clamps, because 80-inch clamps are hard to come by. If you have the clamps, use them, but in this instance they are not essential.

The bed is made with a 3 1/2-inch frame formed into a rectangle as shown. Butt joints glued and screwed make up the outer frame. A ledger strip is added to the inner wall of the frame. This, together with the crosspieces, support the mattress board. The four legs are cut to size and installed with the upper edge aligned with the top of the ledger strips. Cleats are used to attach the legs to the front panel. Two spacer blocks are added to the lower legs in order to align the casters.

To keep the pulls clear of the floor when the front panel is tilted downward, a nose molding is applied around the perimeter of the front section. Be sure the molding is deep enough to keep the knobs off the floor.

The cleats should be glued and screwed to the front panel. However, before applying glue, it is advisable to mount the bed without the glue at first as you test the fit between the bed unit and the lower compartment. Make sure that the clearances are okay and that the bed rides in and out freely. If okay, apply glue and secure permanently.

Add the plywood edging, then sand all surfaces and finish as desired. The unit shown was stained and lacquered, but a two-tone painted finish would be another possibility. The unit could also be left natural with several coats of varnish or lacquer.

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Functional Occasional Table

ALTHOUGH classified here as an "occasional" table, you'll find yourself relying more and more on this as an all-around utility table, continually in use rather than occasionally. Because of its solid construction and sturdiness it will withstand daily use and abuse effortlessly. It can be appropriate used as a coffee table, magazine table, lamp table, or whatever. It is ruggedly built of 1¾-inch pine and has three handy storage drawers. The finished table measures 20 x 44 inches and stands 16½-inches high.

The construction is simple and this project is recommended for all classes of woodworkers, from beginners to advanced.

Start with the construction of the top which is made of 1¾-inch stock. Chances are that you won't be able to get a 20-inch board, so you'll probably have to glue up two or more narrower pieces. True up the edges to be glued and if necessary, resaw to eliminate any bumps or dents at the edges. If you have a jointer or power plane, these will do fine.

Next, drill a series of holes to accept the dowels—six holes should do the trick. Use a dowel drilling jig to accurately center the holes. Use dowel centers to transfer the holes to the mating edge. Drill the holes 1 1/16 inches deep, then apply glue to spiral dowels and insert into the drilled holes. Apply glue to both mating surfaces as well as the projecting dowels, then bring the boards together and clamp until the glue sets.

Make the legs next. Use 3- x 3-inch stock, or if not available, you can glue-up thinner material to make up the 2½-inch squares needed. If you have a jointer, clean the surfaces of the squares taking just a light cut. Trim the ends to size so each piece measures 14½ inches long.

The apron is cut next from 1¼-inch stock. The end and rear aprons are solid but the front is made up in the form of a web so it can accept the drawers. Cut the pieces to size and before assembling the web, drill diagonal screw holes through the top piece (three holes) and one each through the ends of the lower part of the front framework or web.

Diagonal screw holes are also drilled into the other three apron pieces. You can do this by hand with an electric drill or on the drill press. Use a 7/32-inch drill bit to make the clearance holes to take the No. 10 screws. After the frame is glued-up,

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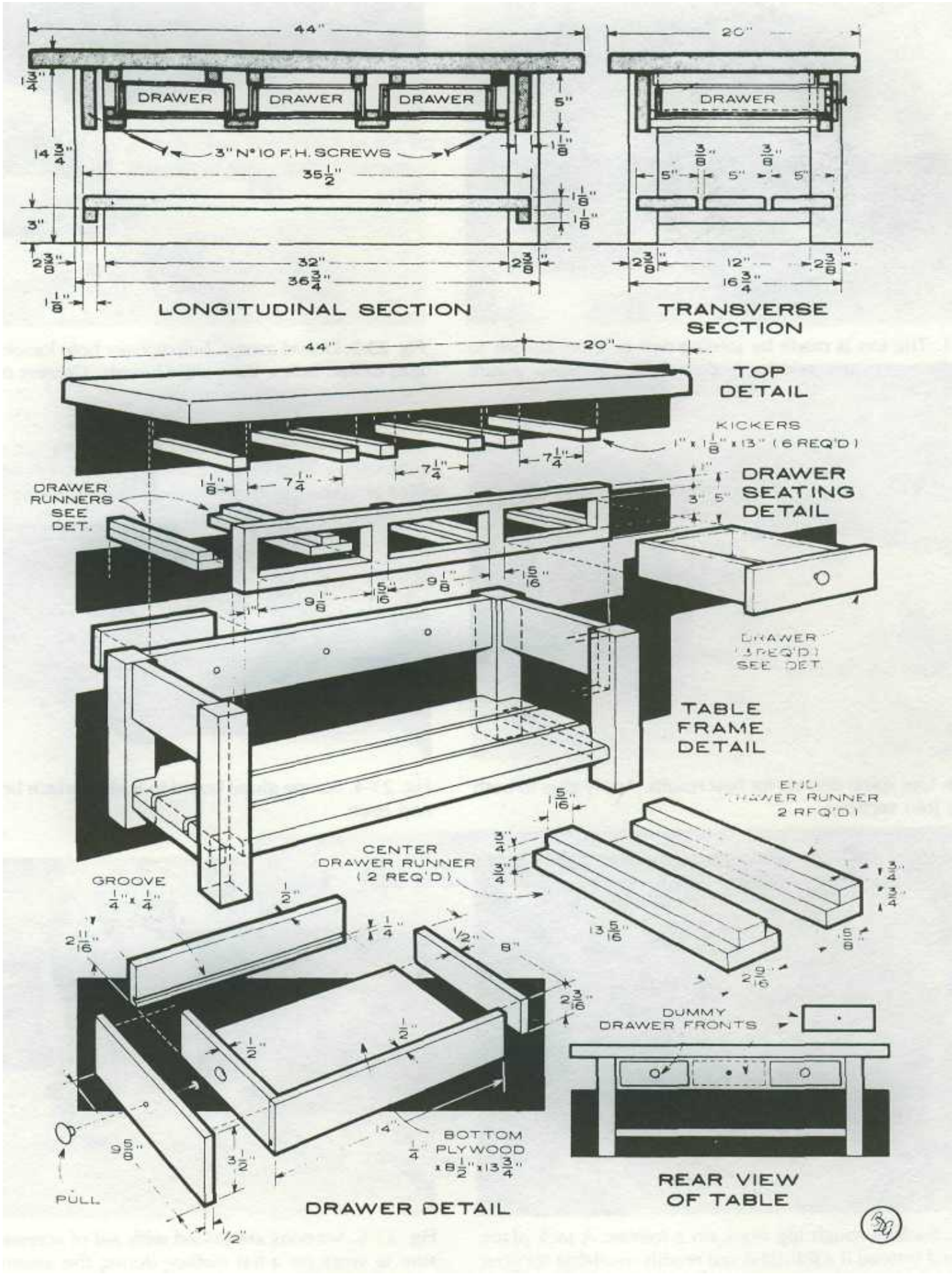

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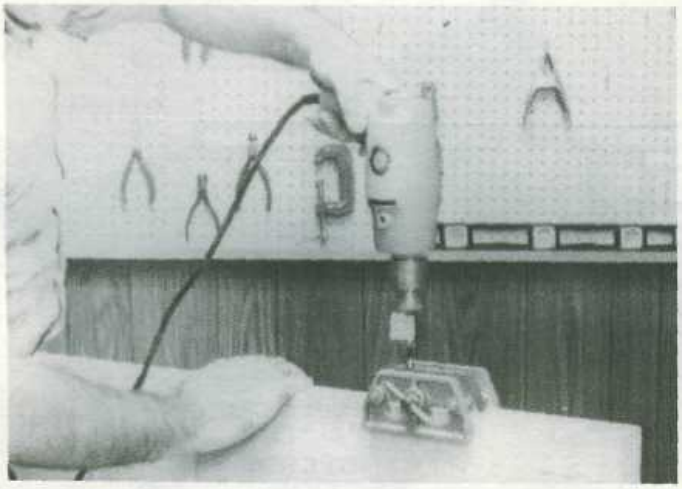

Fig. 23-1. The top is made by joining two or more boards to obtain the necessary width. A dowel jig can help assure accuracy.

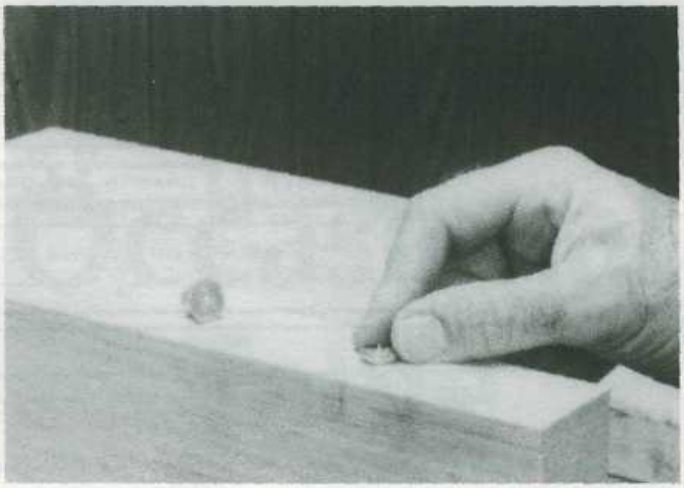

Fig. 23-2. Dowel centers help transfer hole locations. Insert them into drilled holes, then align boards. Centers mark the holes.

Fig. 23-3. Use spiral dowels for best results. Apply glue to both surfaces; join sections.

Fig. 23-4. Scrape glued board to make surface become smooth and even.

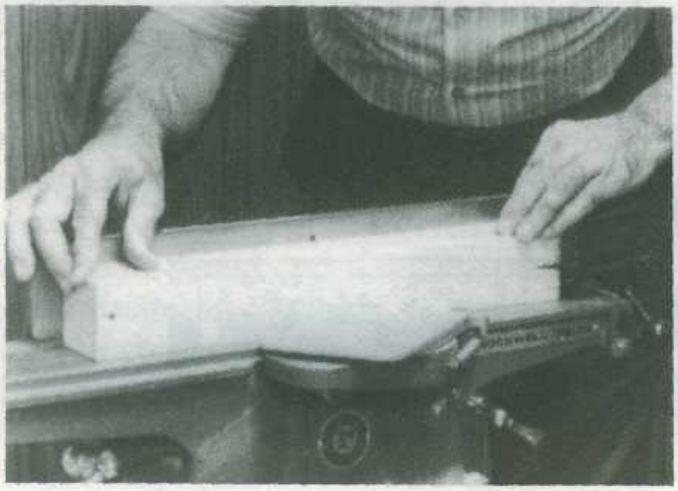

Fig. 23-5. Surface rough leg stock on a jointer. A jack plane can be used instead if a jointer is not readily available for your use.

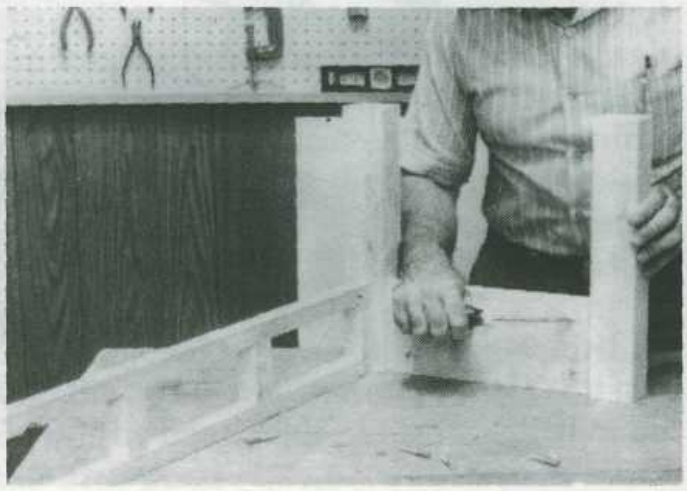

Fig. 23-6. Sections are joined with aid of screws and glue. Be sure to work on a flat surface during the assembly.

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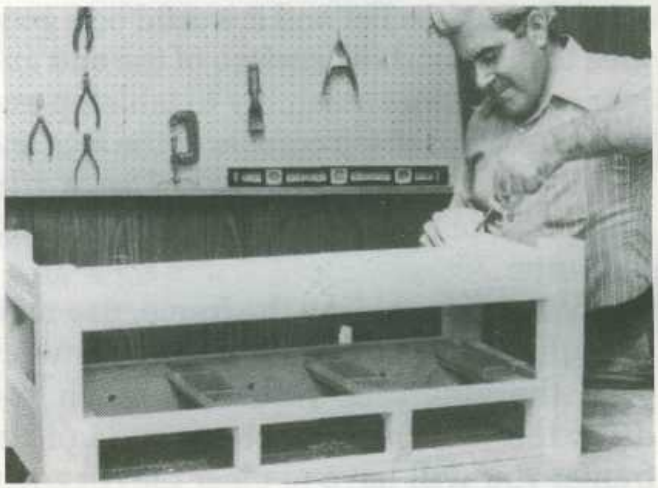

Fig. 23-7. In this step the shelf cleat is screwed to the leg as shown. Note the solid, snug fit of the notched corners.

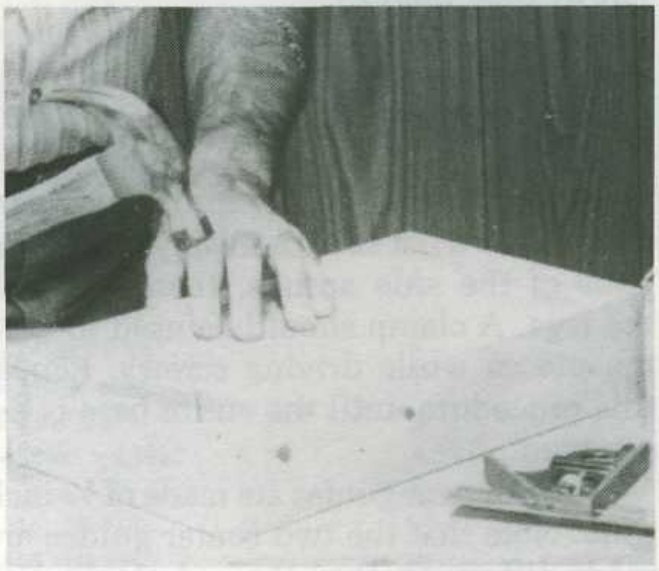

Fig. 23-8. The drawers are of simple butt-joint construction. The bottom panel fits into groove on three sides, is nailed at rear.

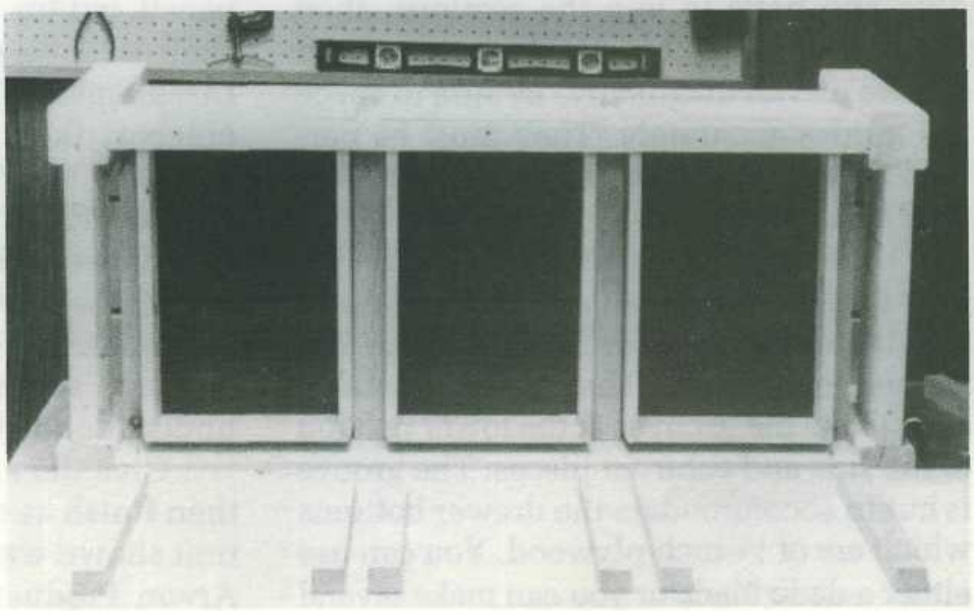

Fig. 23-9. The drawers set in place with the corresponding kickers in top panel.

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sand the surface flat and it would be a good idea to also sand the surface of the end and rear apron before assembly to tabletop and legs. Break the sharp corners of the legs and bottom of the apron pieces. Use a file, sandpaper or router fitted with a rounding-off cutter.

When assembling the frame, use nails and glue and if possible clamp the work until the glue sets. Note that when you drive the nails at the bottom ends of the frame, you will have to clear the diagonal screw. (See photo.)

The tabletop glue joint should be dry at this point. Trim the top to size and sand the edges. Break all sharp corners with a router.

Next, assemble the apron and legs, working on a flat surface. Apply glue to the ends of the side aprons, then attach to the legs. A clamp should be used to hold the pieces while driving screws. Repeat this procedure until the entire base is assembled.

The drawer guides are made of ¾-inch pine. Note that the two center guides are made differently than the end pieces. Use glue and nails to join the sections, then assemble to the apron using glue and screws driven diagonally. Be sure to space the guides accurately. They must be parallel from side to side to assure that drawers will slide freely.

Drawers are made of ½-inch pine, with butt joints. The fronts are doubled up to eliminate the need for fancy joinery. Cut the sections to size. Then, using the table saw, make the grooves at the lower portion of the side and subfront pieces. The groove is cut to accommodate the drawer bottoms which are of ¼-inch plywood. You can use either a dado blade or you can make several passes with a regular blade.

Check the width of the groove with a piece of the plywood to be sure of the fit. The plywood should slide freely in the groove, but it must not be a sloppy fit. Before assembly, drill the ½-inch screw head-clearance hole in the subfront panels. Assemble the drawers with the 1½-inch finishing nails and glue. Drill a 3/16-inch hole in the center of the three drawer fronts before assembling them to the drawers. Use glue and ¾-inch brads, driving the brads from the inside.

Kickers are added to the underside of the tabletop. These are strips of wood used to prevent the drawers from tipping when opened. Space these so they are in alignment with the drawer sides.

The bottom shelf is made next using three pieces of 1⅛-inch stock, 36 inches long. Round the edges and ends of the wood, then join the three with cleats at both ends. The cleats are cut to fit between the legs. Use screws only without glue at this time.

Place the shelf on a flat surface, then place the table in position on top of it. Center the table carefully, then with a sharp pencil, outline the area to be notched so the shelf will clear the legs at the corners. Disassemble the three pieces, cut the notches, then reassemble with glue and screws.

Before gluing, it might be a good idea to reassemble again without glue just to check the fit. If okay, apply glue and assemble. The shelf is held to the legs by driving screws diagonally from the underside of the cleats.

Give the entire table a good sanding, then finish as desired. Finish used on the unit shown was avocado green antique by Arvon Products. It consists of two base coats of latex, followed by a urethane glaze.

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MATERIALS LIST

Note: All lumber is Northern pine.

Purpose	Size	Quantity
Top	1¾" × 20" × 44"	1
Leg	2⅜" × 2⅜" × 14¾"	4
Apron end	1⅛" × 5" × 12"	2
Apron rear	1⅛" × 5" × 32"	1
Shelf	1⅛" × 5" × 36"	3
Cleat	1⅛" × 1⅜" × 12"	2
Frame vertical (end)	1" × 1⅛" × 3"	2
Frame vertical (center)	1⅛" × 1⅜" × 3"	3
Frame horizontal	1" × 1⅛" × 32"	2
End drawer guide (vertical)	¾" × 1" × 13 5/16"	2
End drawer guide (horizontal)	¾" × 1⅜" × 13 5/16"	2
Center drawer guide (vertical)	¾" × 1½" × 13 5/16"	2
Center drawer guide (horizontal)	¾" × 2½" × 13 5/16"	2
Kicker	1" × 1⅛" × 13"	6
Drawer front	½" × 3½" × 9⅝"	6
Drawer side	½" × 2 11/16" × 14"	6
Drawer subfront	½" × 2 11/16" × 8"	3
Drawer rear	½" × 2¼" × 8"	3
Drawer bottom	¼" × 8 5/16" × 13⅝"	3
Knobs		6
Screws	3"—No. 10 FH	16
Screws	2"—No. 10 FH	28
Glue		
Nails		

The glaze is applied after the base has dried, using either a brush or cheesecloth, making wiped or streaked patterns as you go. Add pulls to drawers and the table is ready to serve you.

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Handsome Wardrobe

THIS BEAUTIFULLY DESIGNED and well-proportioned dresser will be welcomed and proudly displayed in any home. Six of the drawers are the pull-out (tote) type, and the other six are conventional drawers. In addition, there are two adjustable shelves for convenient storage.

Construction is simplified greatly by the use of oak plywood. Narrow boards need not be glued-up to make the wide boards for the ends and top—something you would have to do if you were working with solid oak.

Another nice feature is the use of moldings to give the appearance of raised panels. Further simplification in construction is achieved by the use of butts joints.

Although it is a professional-looking furniture piece, it has been designed so that even a novice woodworker can make it without difficulty.

The main part of the case consists of four uprights fastened at the top with a plywood frame. The lower ends are fastened to the floorboard, which extends at the ends and front. Construction is simplified by the use of butt joints, but some woodworkers may prefer to use rabbets and dadoes for joining these parts. If so, the measurements will have to be altered accordingly.

Since plywood is used in the construction, the exposed edges will have to be covered with matching wood tape. The measurements do not include the thickness of the tape as it is nominal. Simply apply the tape to the plywood edges after the parts have been cut to size.

Cut the top frame using fir plywood

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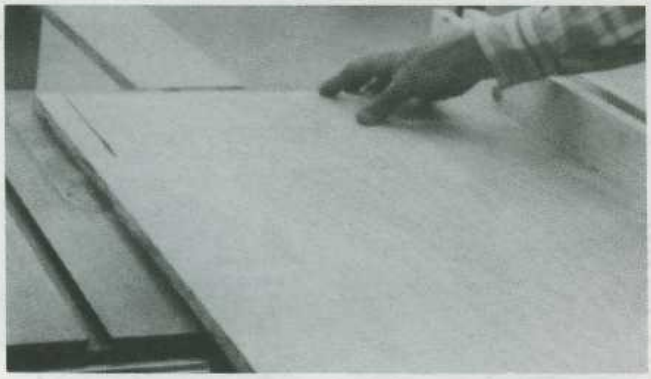

Fig. 24-1. The end panel is trimmed to size on a table saw. For a smooth, clean cut, use a plywood blade. Sand before assembly.

Fig. 24-2. Once the frame pieces have been cut, apply glue, insert the splines and clamp. Check to see if all right angles are true.

Fig. 24-3. Fasten the top frame to the end panel with glue and wood screws. Exposed plywood edges are banded with wood tape.

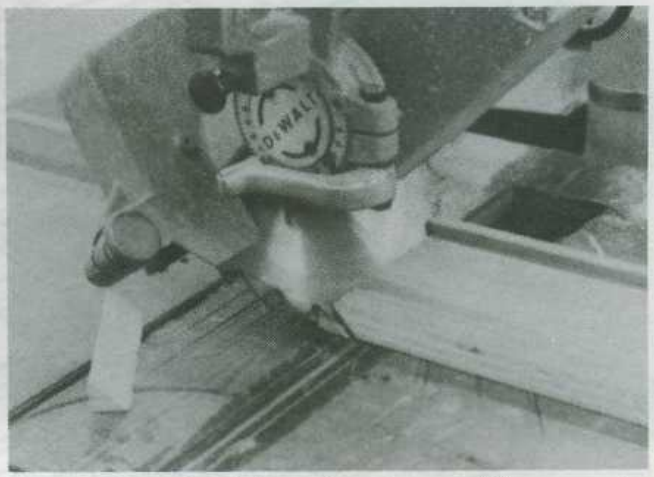

Fig. 24-4. Base piece is best mitered on a radial arm saw; try test cuts on scrap first. A special blade is called for here.

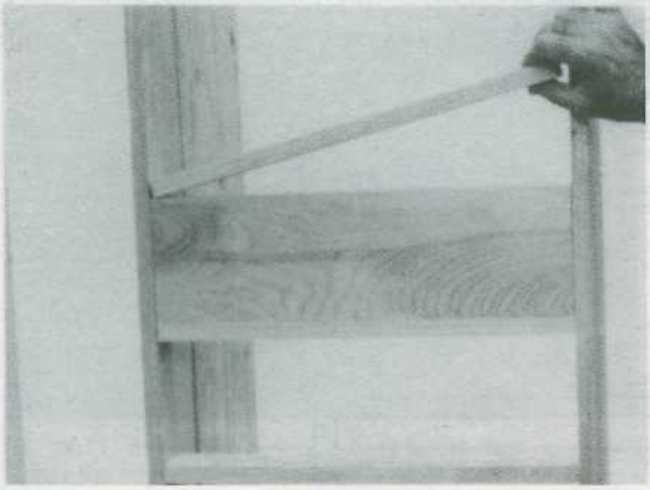

Fig. 24-5. Use a spacer to locate the proper position for the drawer frames within the larger frame; accuracy is very important.

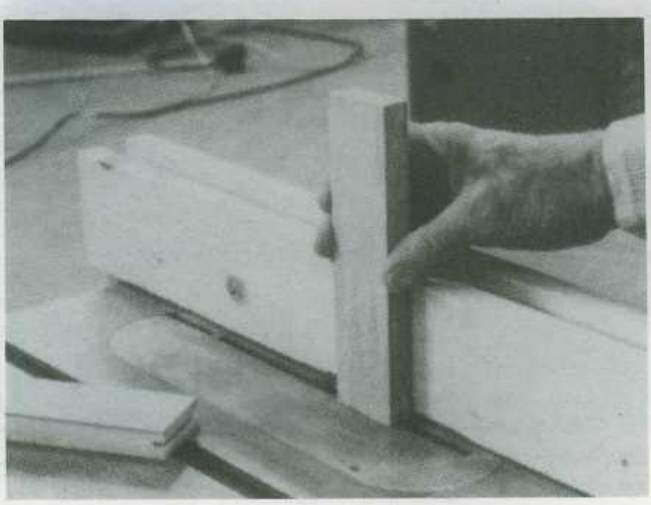

Fig. 24-6. The ends of the rails are grooved in order to accommodate ⅛-inch plywood splines. Keep your fingers away from the blade!

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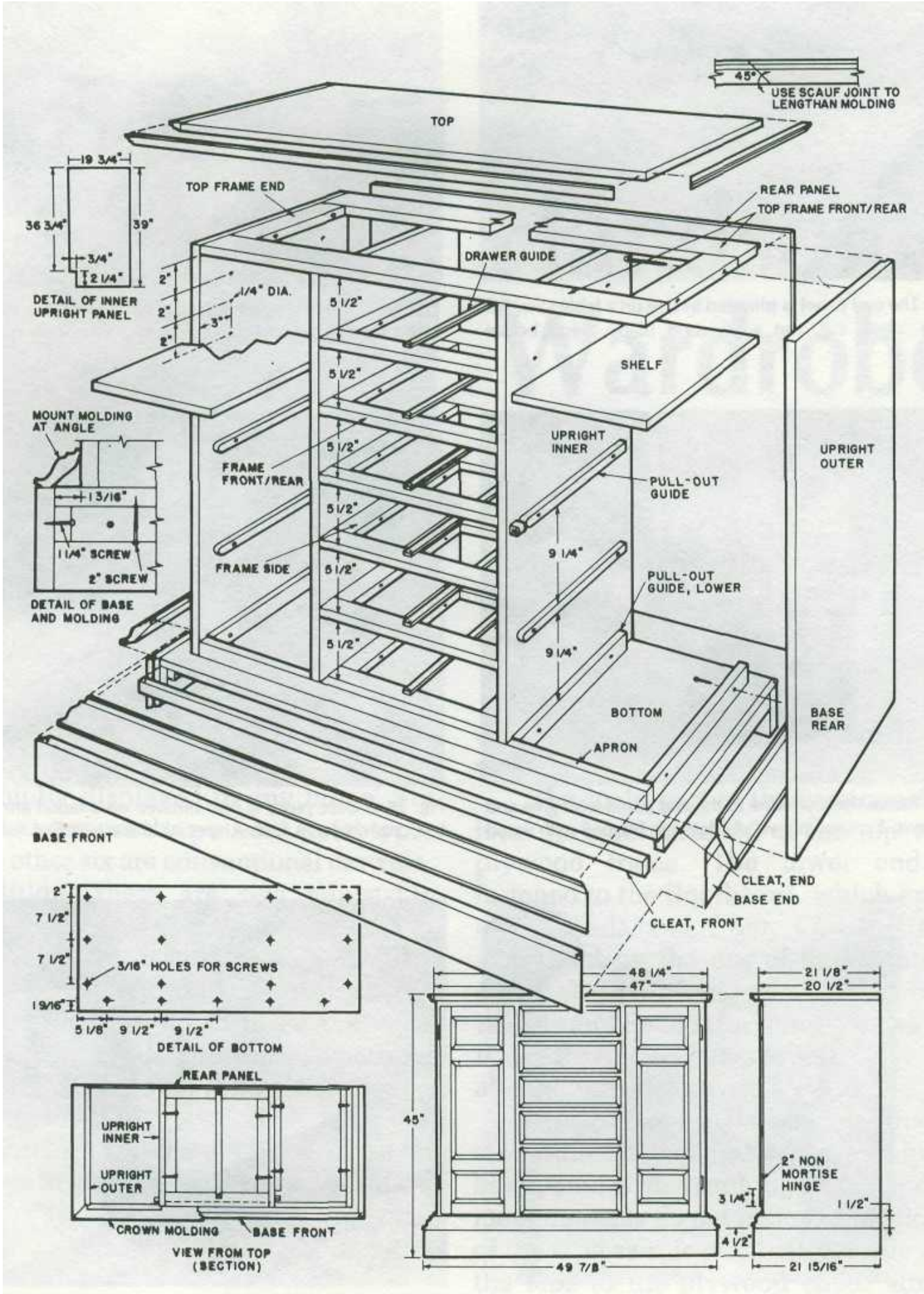

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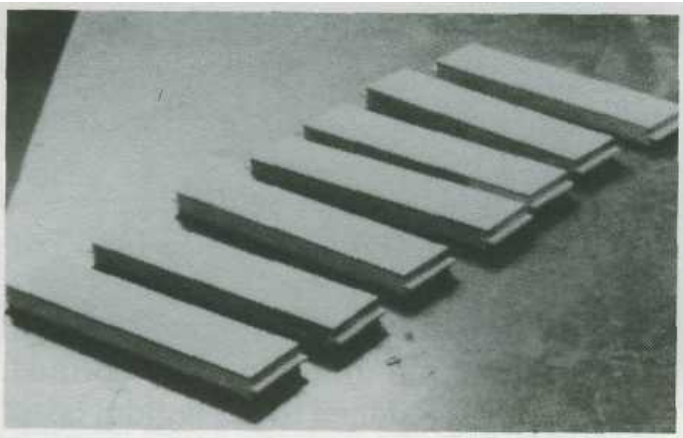

Fig. 24-7. Here, the rail members for the door frames have been fitted with splines and are ready to be glued on to the stiles.

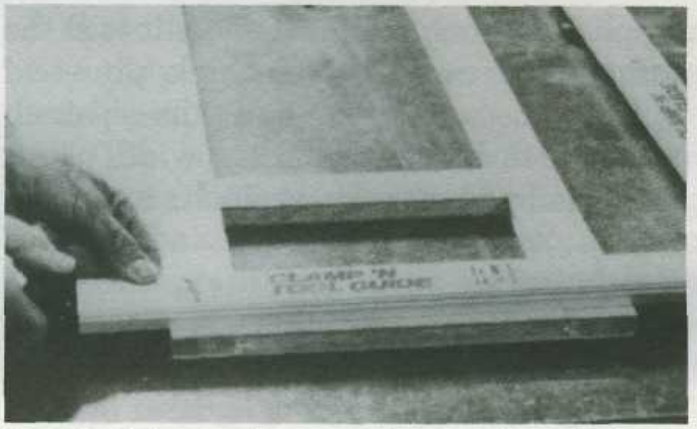

Fig. 24-8. A clamp tool is great for frame work. Its plastic jaws will not gouge surfaces, and squeeze-out is kept to a minimum.

Fig. 24-9. After you've finished assembling the door frames, break the sharp corners with a router fitted with a bevel-trimmer bit.

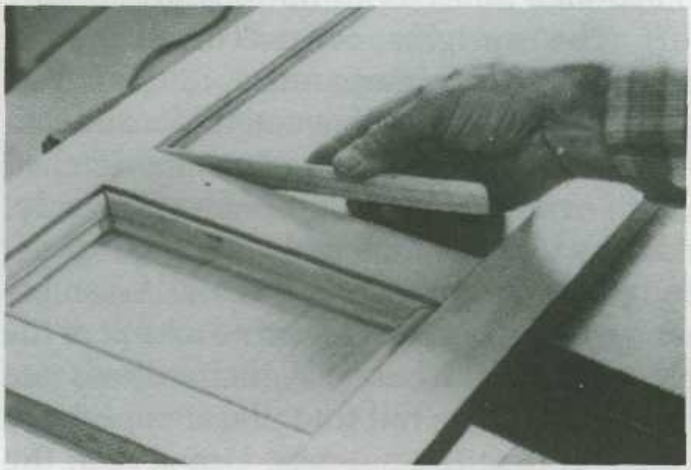

Fig. 24-10. The raised panel effect on the doors is achieved with mitered nose & cove molding. Install with glue only—no brads.

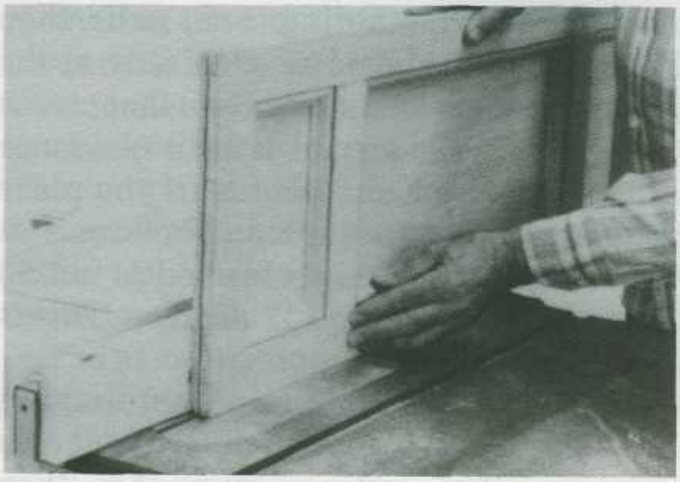

Fig. 24-11. Attach the plywood back to the door frame and rabbet the edges of the frame on a table saw. Watch those fingers!

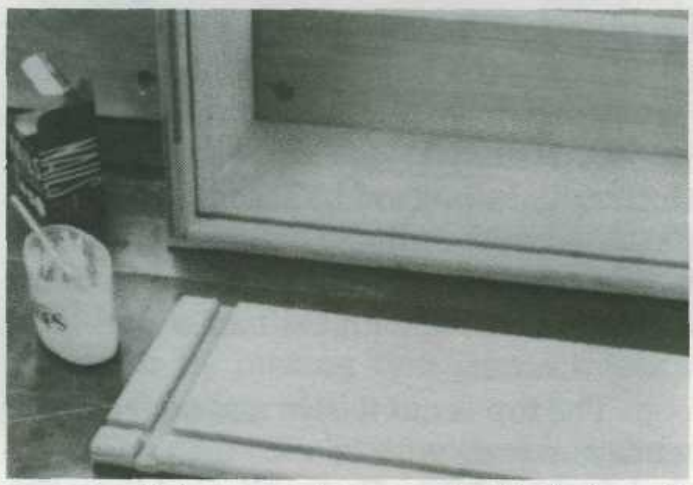

Fig. 24-12. All drawer members are made of birch plywood. The above side member with dado and groove is ready for assembly.

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ripped to 3-inch widths. Use splines at the joints. We used ⅛-inch-thick plywood splines because we had the ⅛-inch plywood on hand and the kerf width of our saw blade is exactly ⅛ inch, a perfect match. You can substitute ¼-inch splines if necessary.

After the frame parts are cut, apply glue, insert the splines, then clamp, making sure the frame is square.

Cut the floor board from a piece of ¾-inch fir plywood, then drill the screw clearance holes as in the layout.

The uprights consist of two outer members which measure 20 × 39¾ inches. The inner uprights are cut 19¾ × 39 inches and the lower front edges are notched to fit over the lower rail. Before assembly, cut the ¼- × -⅜-inch rabbets along the rear edges of the two outer panels. Assemble the parts using 2-inch screws except at the top outside, where 3½-inch screws are needed. Fit the rail into place, applying a little glue at the notches. Use glue at the other joints also.

The drawer compartment frames are prepared next. These are cut from ¾-inch plywood. Before cutting the five pieces for the front of the frames, apply the matching wood tape to an 8-foot length of the ripped (2-inch) stock, then cut apart into the individual pieces. These frames are fastened with splines. Before assembling, drill the holes for the screws into the frame sides. Assemble with 2½-inch round-head (RH) screws.

The top is cut to size and edged at the ends and front with ⅝- × -¾-inch nose-and-cove oak molding. Fasten the molding with glue and wire brads. Miter the molding at the ends. If your molding is too short to make the length, use a scarf joint to join the two pieces as shown. Hold the molding at the mounting angle when cutting the scarf joint and miters. This is especially important when mitering the crown molding at the base.

The top is fastened by driving screws through the top frame. Use 1¼-inch flat-head (FH) screws.

The base consists of the two ends and front, which are mitered and splined. These are then fastened to the bottom board with cleats. The rear base piece is mounted separately without a cleat.

A clamp nail was used for the mitered joints because they pull the joint tight and are far superior to using wood splines. To make the joint, cut the 45-degree miters in the usual manner using the radial arm saw or table saw. Now replace the regular blade with a 22-gauge blade which is made especially for clamp nails. Make the cuts 5/16 inch deep, then join as shown. Be sure to insert the wide or flared end of the clamp nail into the kerf cuts, then drive the nail home with a few hammer blows. Also be sure to apply glue to the mitered surfaces before nailing. Assemble the base with cleats as indicated.

The crown molding is cut to fit, then fastened with glue. Use glue only at the bottom surface as shown. Note that crown moldings are designed with a clearance angle at the back and bottom. If you place a square against the back and bottom, you will note that the angle formed is not 90 degrees, but closer to 112 degrees. This is intentional.

The runners for the pull-out drawers are cut to size and shape as per the drawing. The outer corners are then rounded using a router. Install using round-head screws.

The pull-out drawers are made of ½-inch birch plywood. Cut the members to

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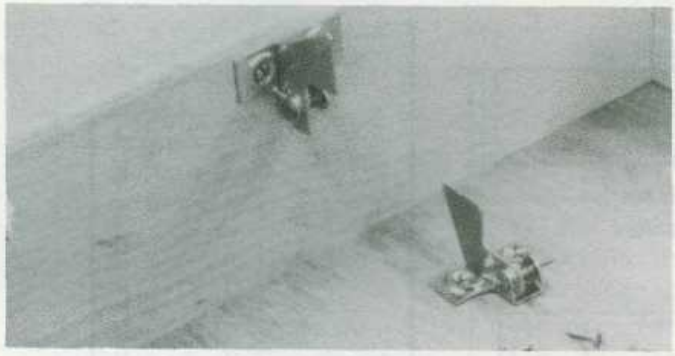

Fig. 24-13(A). These optional spring-loaded drawer stops will effectively prevent the drawers from being pulled out too far accidentally.

Fig. 24-13(B). A view of the assembled wardrobe with some of the drawers removed. Leave the back panel off until interior is finished.

size, then rabbet the front and rear panels to take the sides. Cut the ¼-inch groove ⅝ inch from the bottom. Then, before assembling, use the router with a 3/16-inch rounding bit to round all top edges. Stop the routing just short of the ends at the insides of the side panels. See detail. Cut the bottom panels to size and insert into place as you assemble the sides, front and rear. Apply glue to the joints and fasten with brads. Do not glue the bottom panel.

The center drawers are also made with ½-inch birch, but they have an additional front made of oak plywood to match the rest of the cabinet.

The grooves and rabbets are similar to the pull-out drawers, but at the rear, the side panels are dadoed since the rear panel is set back ½ inch. The other difference is that the bottom panel is installed after assembly, and nailed to the bottom of the rear panel.

The subfront is drilled for the two clearance holes and the four mounting holes. The clearance holes are necessary so the drawer pulls can be mounted from inside the drawer. The mounting holes are for the 1-inch screws which fasten the front to the subfront.

The raised panel effect is achieved by the application of molding at the edges of the front panel. Miter these at the corners and fasten with glue only—no brads. Apply the glue with a small brush to the backs of the molding as well as the mitered ends.

The drawer slide is made of hardwood. The 13/16-inch groove is cut ¼ inch deep using a dado blade. The 13/16-inch width allows 1/16-inch overall clearance over the ¾-inch wide drawer guide. Center the slide at the bottom of the drawer and fasten with glue.

Each door frame consists of two stiles and four rails. These are fastened with splined joints, and a ¼-inch oak plywood backing is then fastened to the frame. Finally, nose-and-cove molding is mitered and glued into each of the openings for the raised panel effect.

The ¼-inch panel is fastened to the frame with glue and brads. Keep the brads away from the edges which will be rabbeted. The rabbeting can be done with a router or on the table saw using a dado blade or by making two passes using a regular cutting blade.

The doors are hung with non-mortise offset hinges, two per door. A 5/16-inch hole for the pendant pull is drilled on the inside stiles.

An adjustable magnetic catch is used to hold the door closed. Place the catch in

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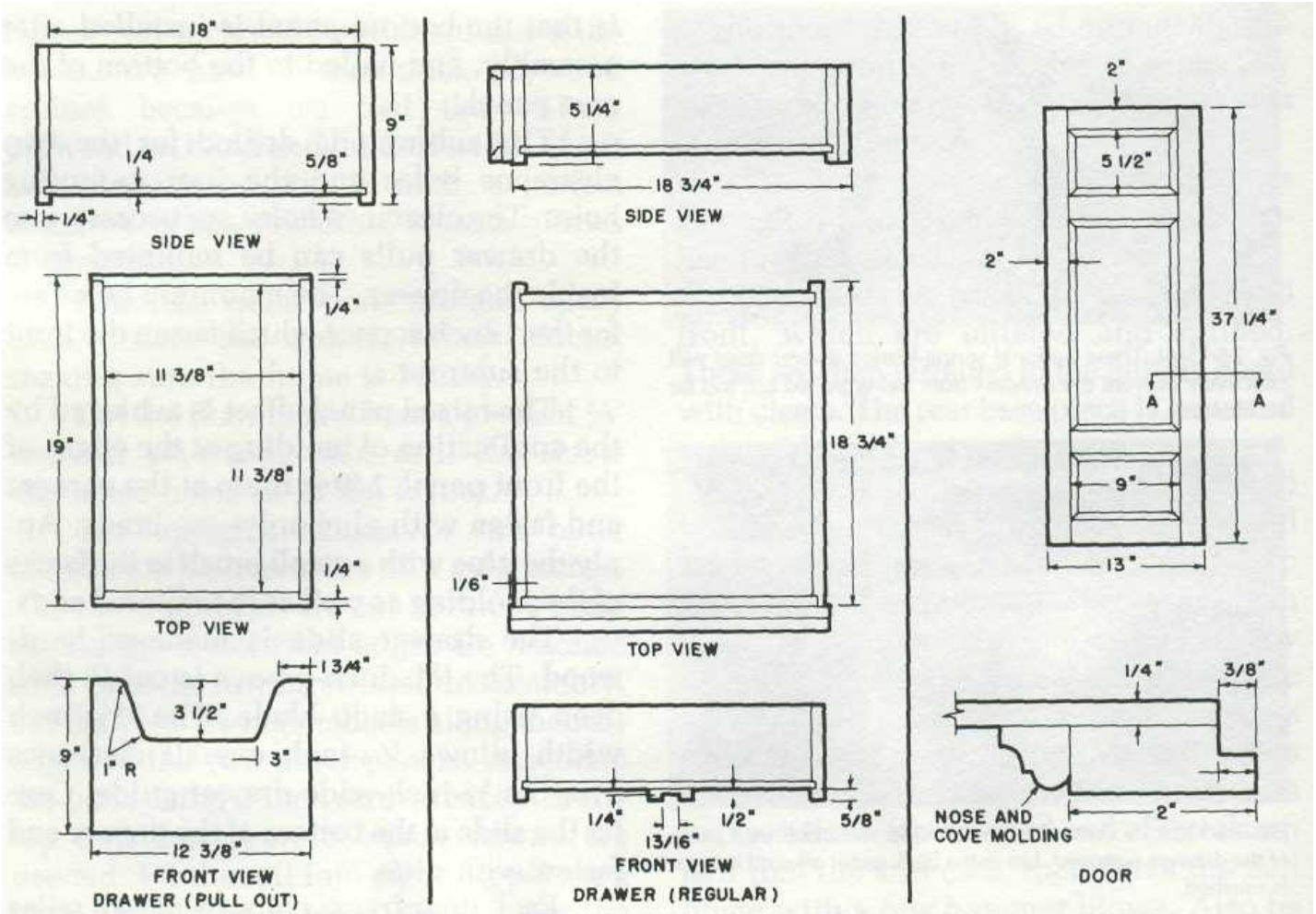

line with the upper pull-out drawer guide so it will not interfere with the operation of the drawers.

The ¼-inch rear panel is installed using ⅝-inch round-head screws. Do not install the panel until the staining and topcoating operations are completed. With the back panel off, you will be able to finish inside the cabinet from front and rear.

The finishing operation consists of an application of paste wood filler, followed by two coats of sanding sealer and three coats of semigloss lacquer. After a one-week drying time, a final application of rubbing compound is made.

The filler is thinned to a consistency of heavy cream (*not* whipped cream). It should be brushed on with the grain. In a matter of minutes it will start to flatten and appear dull. When this happens, start to remove the surplus filler by wiping across the grain of the wood, using coarse rags—preferably burlap. Finish wiping with clean soft rags, stroking with the grain direction. Allow to dry, then apply the sealer. When the sealer has dried, apply the topcoats of gloss or semigloss lacquer.

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MATERIALS LIST

Purpose	Size	Description	Quantity
Cabinet			
Upright, outer	¾" × 20" × 39¾"	Oak plywood	2
Upright, inner	¾" × 19¾" × 39"	Fir plywood	2
Top	¾" × 20½" × 47"	Oak plywood	1
Top frame end	¾" × 3" × 14"	Fir plywood	2
Top frame front/rear	¾" × 3" × 44½"	Fir plywood	2
Bottom	¾" × 21 3/16" × 48⅜"	Fir plywood	1
Base front	¾" × 4½" × 49⅞"	Oak plywood	1
Base end	¾" × 4½" × 21 15/16"	Oak plywood	2
Base rear	¾" × 3¾" × 48⅜"	Fir plywood	1
Rear panel	¼" × 39 11/16" × 45 3/16"	Fir plywood	1
Cleat, front	¾" × 1½" × 48"	Pine	1
Cleat, end	¾" × 1½" × 19"	Pine	2
Frame front/rear	¾" × 2" × 18"	Fir plywood	12
Frame, side	¾" × 2" × 15¾"	Fir plywood	12
Drawer guide	7/16" × ¾" × 18¾"	Solid oak	6
Pull-out guide	¾" × ¾" × 18"	Solid oak	8
Pull-out guide, lower	¾" × 2 5/16" × 19"	Solid oak	2
Apron	¾" × 2¼" × 44½"	Oak plywood	1
Shelf	¾" × 12⅜" × 18½"	Oak plywood	2
Door			
Stile	¾" × 2" × 37¼"	Oak plywood	4
Rail	¾" × 2" × 9"	Oak plywood	8
Door panel	¼" × 13" × 37¼"	Oak plywood	2
Drawer (pull out)			
Side	½" × 9" × 19"	Birch plywood	12
Front/rear	½" × 9" × 12⅜"	Birch plywood	12
Bottom	¼" × 11 13/16" × 18 7/16"	Fir plywood	6
Drawer (regular)			
Side	½" × 5¼" × 18¾"	Birch plywood	12
Subfront	½" × 5¼" × 17¼"	Birch plywood	6
Rear	½" × 4⅜" × 17¼"	Birch plywood	6
Front	¾" × 5⅜" × 17⅞"	Oak plywood	6
Bottom	¼" × 17 3/16" × 17¾"	Fir plywood	6
Slide	½" × 2¼" × 18"	Solid oak	6
Miscellaneous			
Molding, nose and cove	⅝" × ¾"	Oak	48 ft.
Molding, crown	2½"	Oak	11 ft.
Screw	⅝"—5 RH		16
Screw	3½"—10 RH		20
Screw	1"—8 FH		8
Screw	2"—10 RH		38
Screw	2½"—10 RH		20
Screw	1¼"—8 RH		8
Brad	1"	No. 18	36
Nail	1½"		144
Pull, Chippendale		(No. 70002)	6
Pull, Pendant		(No. 70008)	2
Glue			8 oz.
Wood Tape		Oak type	16 ft.
Hinges, Non-Mortise		(No. 78006)	4
Magnetic Catch		(No. 75002)	2
Shelf Bracket		(No. 77504)	8
Spline	⅛" × ½" × 2"	Gum plywood	36
Clamp nail	4"		2

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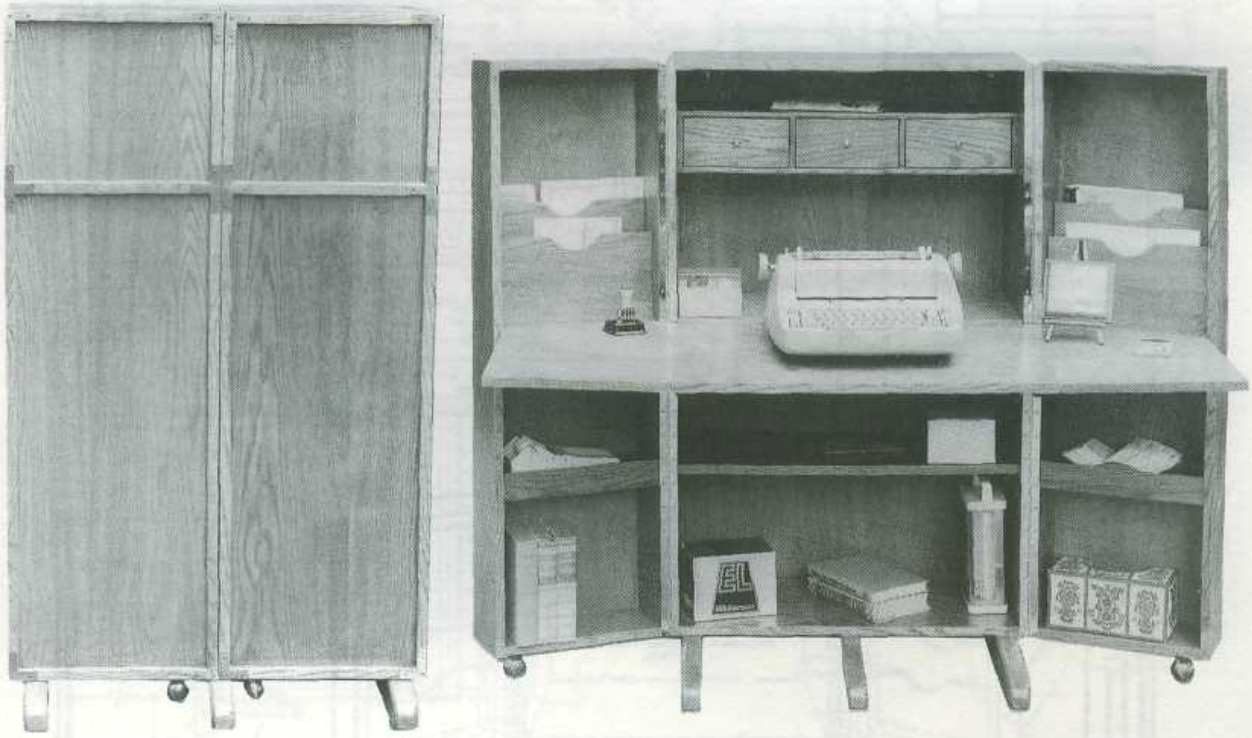
Home Office



THIS HIDEAWAY HOME OFFICE is an unobtrusive piece of furniture when closed, but open the two doors and—presto!—you have a large size writing desk, filing space and ample storage. Everything is within easy reach so you can handle the complexities of bills, taxes, credit accounts, and other chores common to all householders.

The size of the cabinet when closed is 20 × 30 × 50½ inches. When open, it measures 30 × 60 × 50½ inches. The desk surface is 21 × 56 inches. A unique method is used to support the flaps of the desk: a pin located on the door shelf engages a matching hole in the desk flap. This rigidly supports the flap and locks the door in the open position. Flip-top hinges enable the flaps to fold onto the main desk section: all can then fold up compactly. Two retractable supports add to the sturdiness of this piece.

Lumber used for this project was ¼-, ½-, and ¾-inch plywood. Some solid lumber is also utilized. The most difficult part of this project is the mitering of the panels to form the cabinet and doors. All other construction is rather basic and easy to do.

Oak plywood was used in construction but other species may be substituted. Rip the panels to size as shown in the Materials List, then proceed to miter the ends. The mitered joint may be made in several ways, either on the table saw using saw and router, or with the shaper. Choose the method best suited to your equipment and skill. We used the offset miter, which

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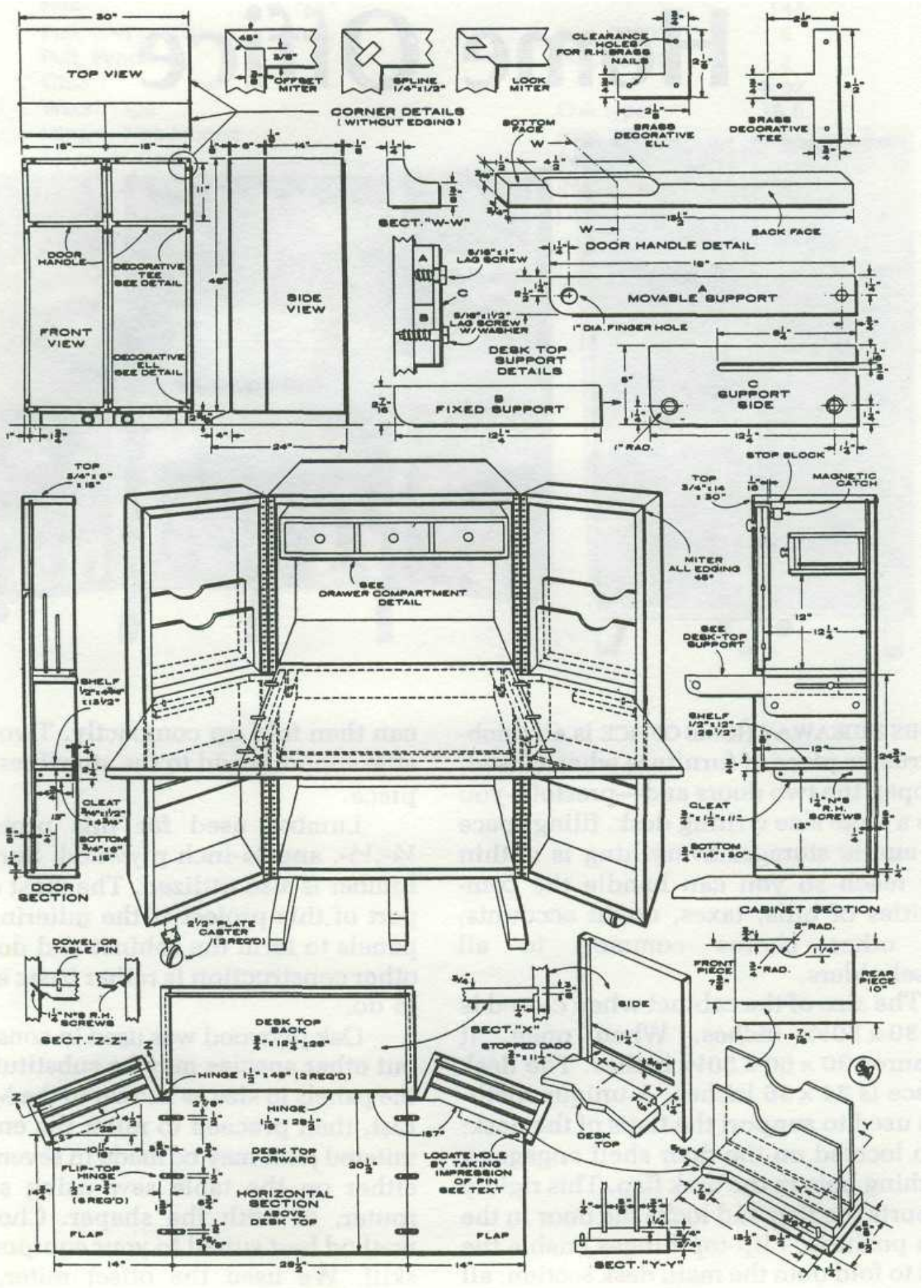

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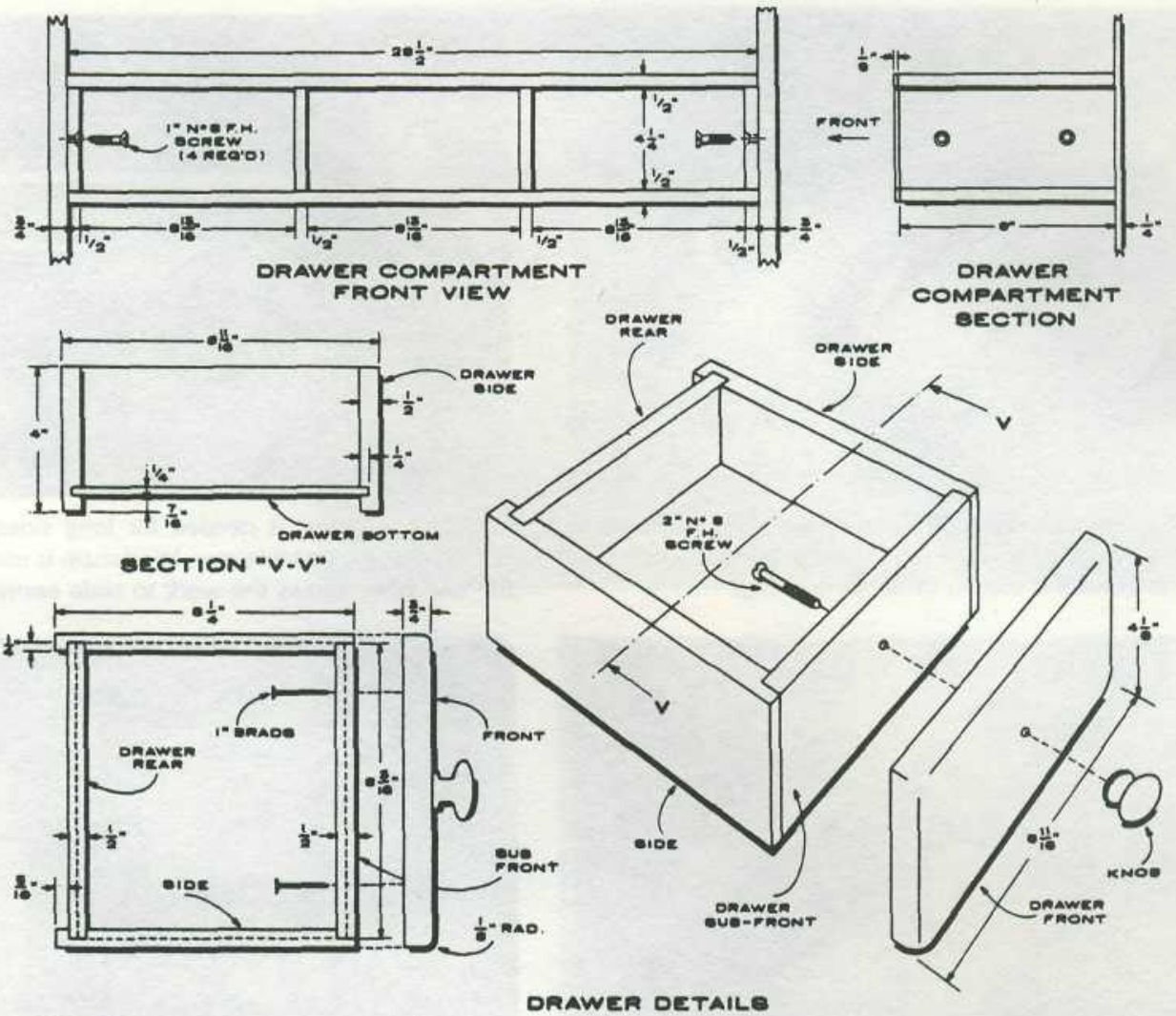

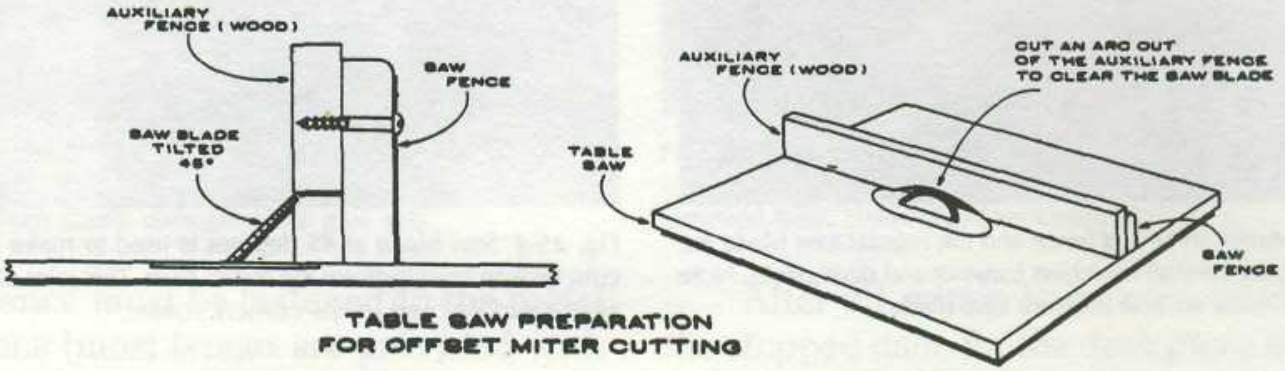

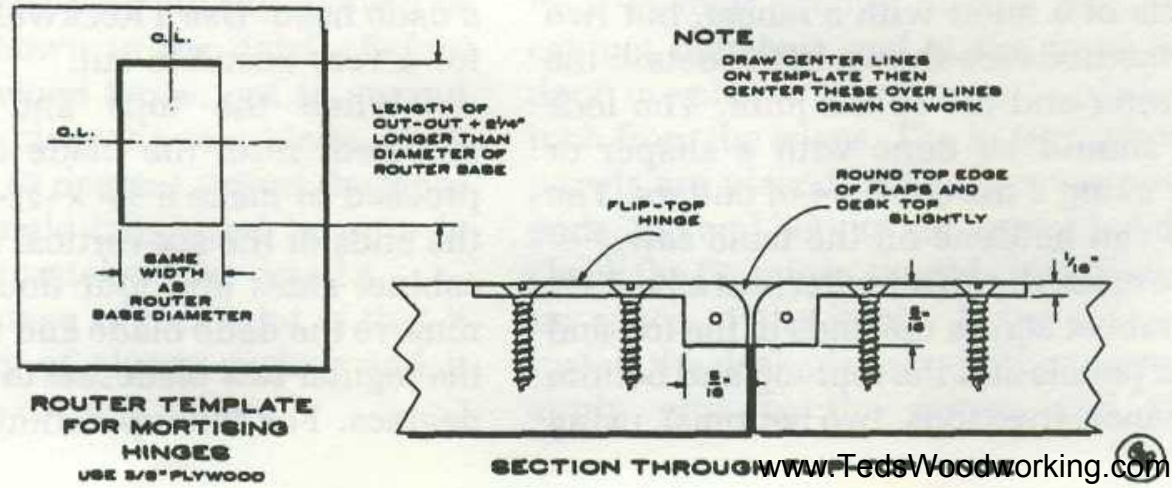

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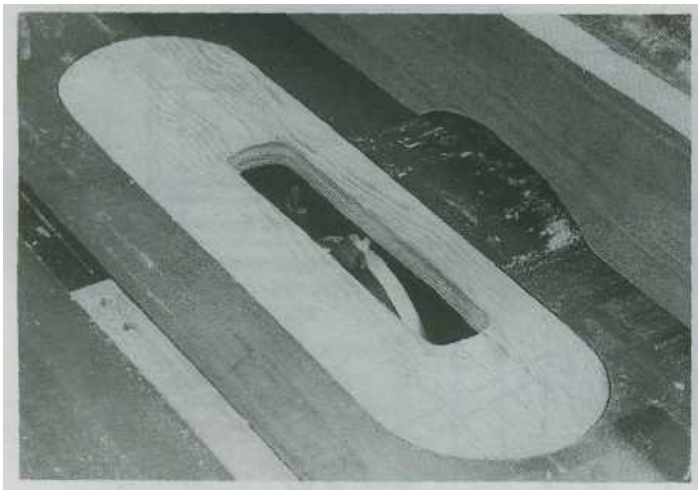

Fig. 25-1. Wide-slot plywood insert replaces regular insert in table saw. Wobble head is used to rabbet panels. Alternative cutting methods are shown in detail drawing.

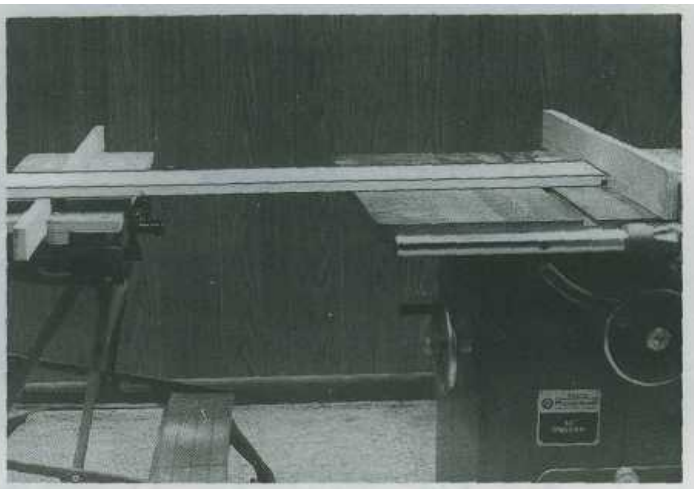

Fig. 25-2. Support is needed for long sides when you are rabbeting them on table saw. Workmate is used here. Wax on the saw table allows the work to slide easily.

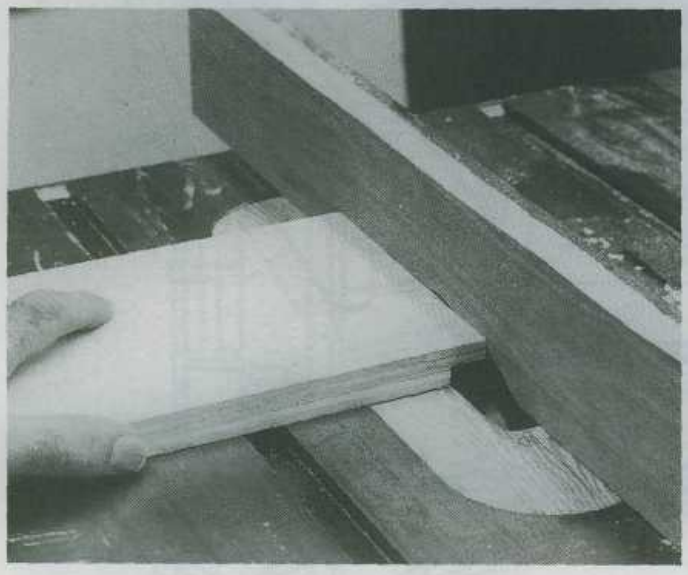

Fig. 25-3. Auxiliary wood fence and the regular saw blade are used to rabbet vertical members (cabinet and door sides). Note arc cut in fence so that it clears saw blade.

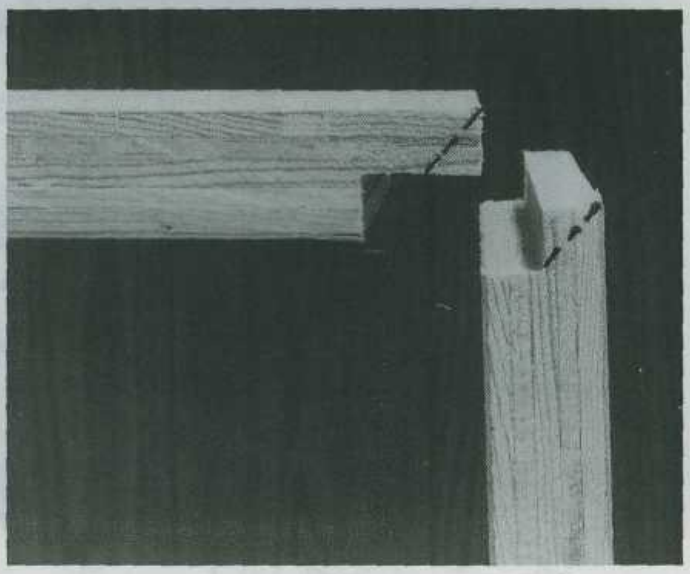

Fig. 25-4. Saw blade at 45 degrees is used to make the angle cuts; broken lines indicate the miters here. This joint offers good gluing surface, and keeps corners square.

consists of a miter with a rabbet, but two other methods are shown in the detail: the lock miter and the spline joint. The lock miter should be done with a shaper or router using a matched set of cutters. The spline can be done on the table saw.

To make the offset miter, cut a ⅜- × -¾ -inch rabbet across the ends of the top and bottom panels and the four top and bottom door panels (two tops, two bottoms), using a dado head. Use a Rockwell wobble head for a very accurate cut.

When the tops and bottoms are rabbeted, reset the blade or fence, then proceed to make a ⅜- × -⅜-inch rabbet at the ends of the six vertical members (two cabinet sides and four door sides). Now remove the dado blade and replace it with the regular saw blade, set to an angle of 45 degrees. For this operation, an auxiliary

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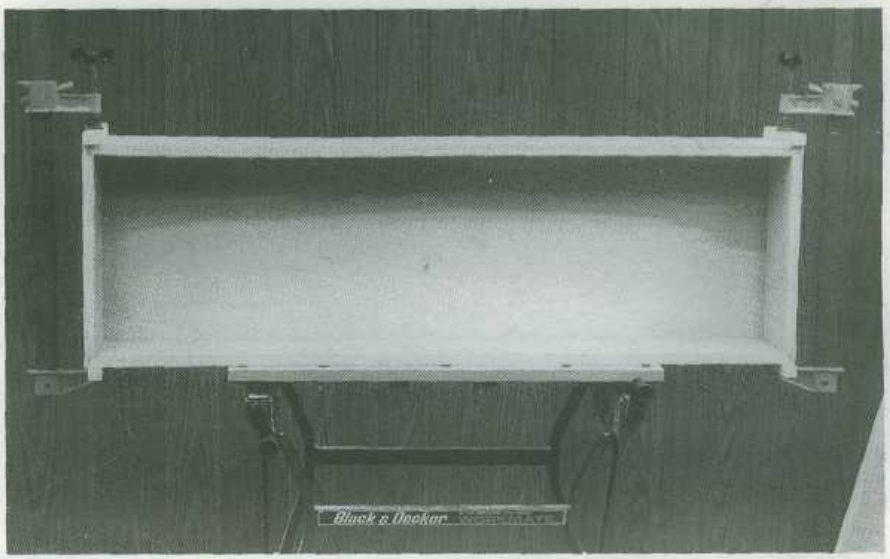

Fig. 25-5. After ¼-inch slot has been cut for rear panel, the panel is installed and cabinet is clamped up on short ends until glue sets. Rear panel floats free in slots.

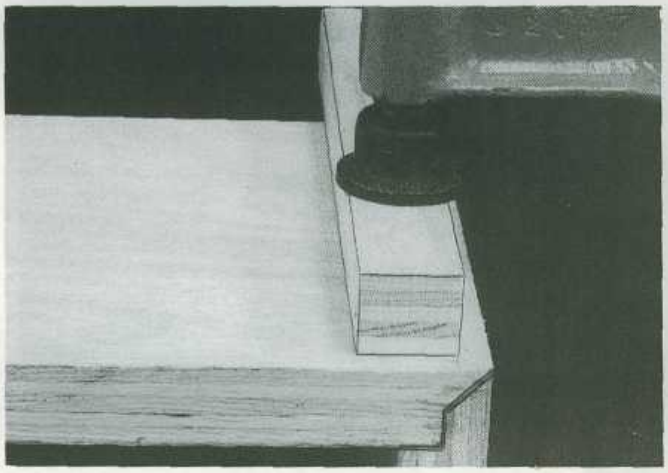

Fig. 25-6. Closeup of mitered corner; miters should close flush with no space at the joint. In this photo, a wood scrap protects the work from clamp damage while glue sets.

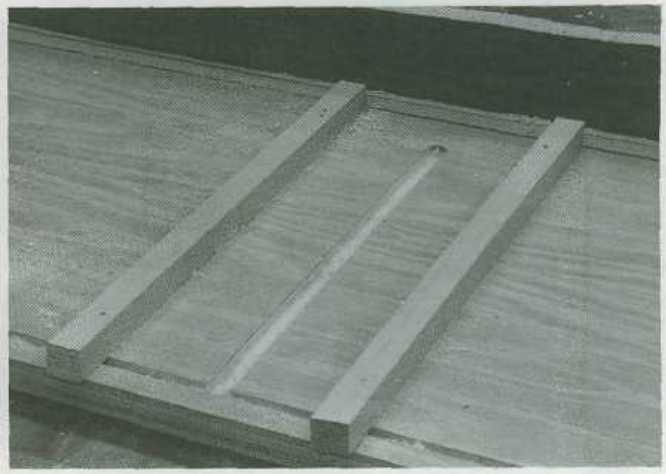

Fig. 25-7. Stopped dado, which will accept the desk top, is cut with a router. Side glides, for accuracy with the router, will be removed later. Study drawings carefully.

wood fence must be fastened to the metal saw fence (most fences are provided with holes for this purpose); simply screw it to the fence as shown in the detail. Before mounting the wood fence, cut an arc out of the piece to clear the saw blade. With the blade set at 45 degrees, adjust the fence to make the angle cuts—and be sure to make them accurately. (See detail.)

The advantage of this joint is that it provides plenty of gluing surface and it helps keep the corners square.

After all miters have been made, cut the stopped dado for the desk piece and the ¼- x -¼-inch groove at the rear of the cabinet members and at the front of the door members. The groove is placed ⅝-inch from the edges. The ¼-inch plywood panels are placed in the grooves and the ends, top and bottom are assembled dry to check the fit: miters should close flush with no space at the joints. If the fit's okay, install the desk piece and other members, apply glue to the miters and clamp

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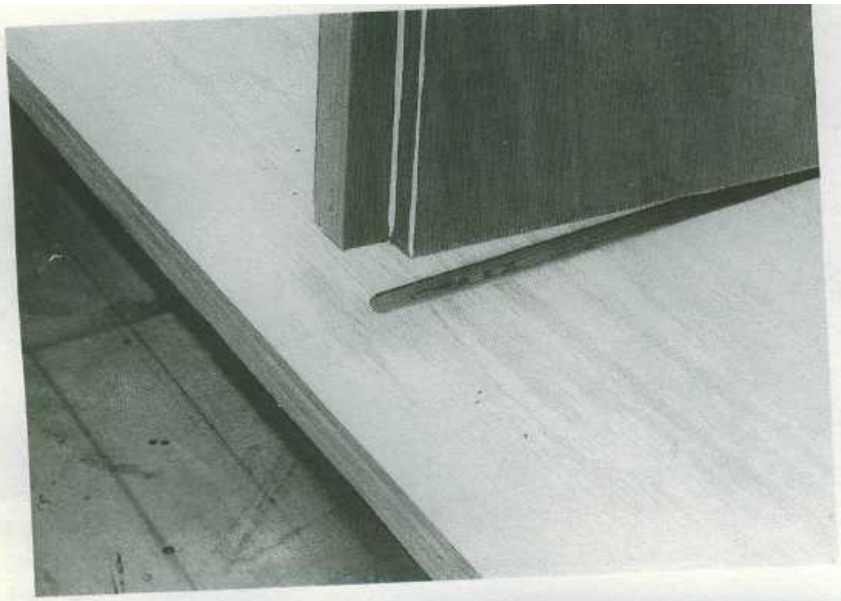

Fig. 25-8. With router guides removed, fit of rabbeted desk top to stopped dado is tested by designer in this photograph. For professional job, fit should be precise.

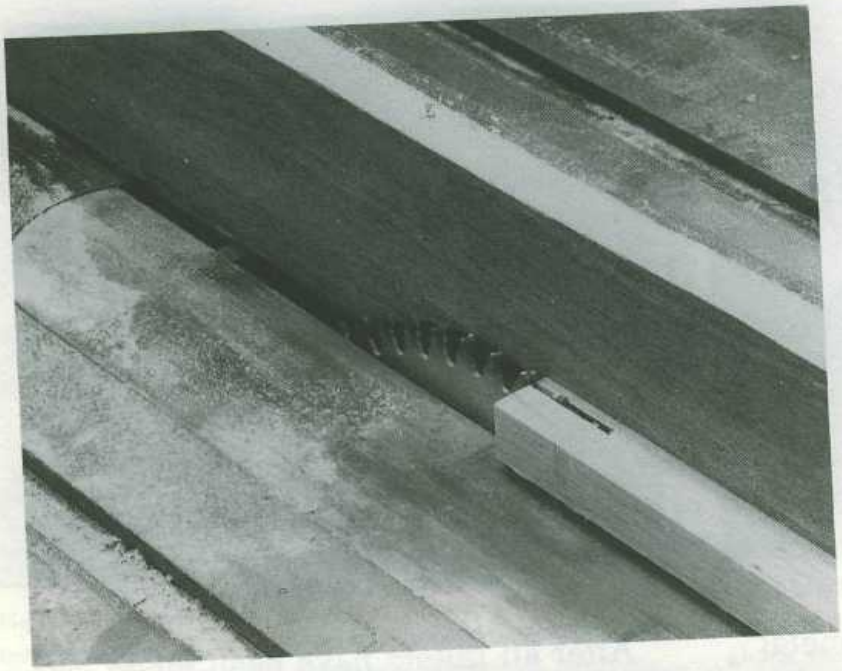

Fig. 25-9. Though veneer tape can be used to correct exposed plywood edges, solid strips are recommended. Here they are ripped from solid stock. Each strip is ⅛ inch by ¾ inch.

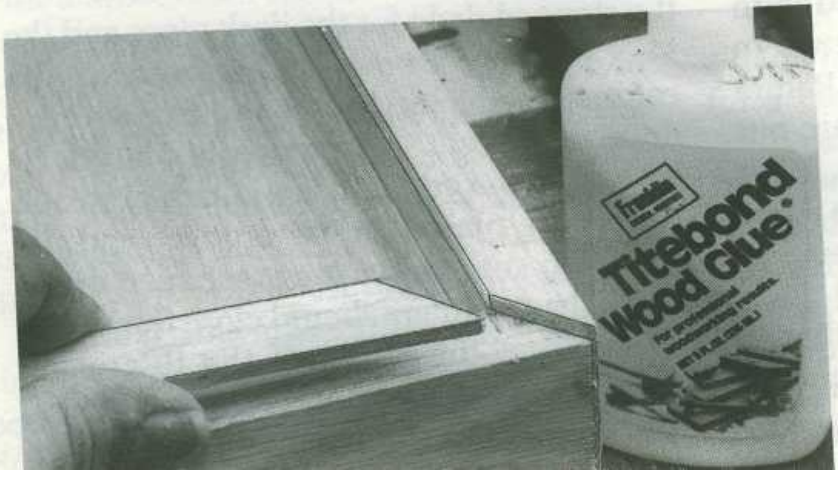

Fig. 25-10. Ends of the strips are mitered and each piece is carefully fitted. Apply glue to the plywood edge and strip and fasten with brads. See text regarding edging brads.

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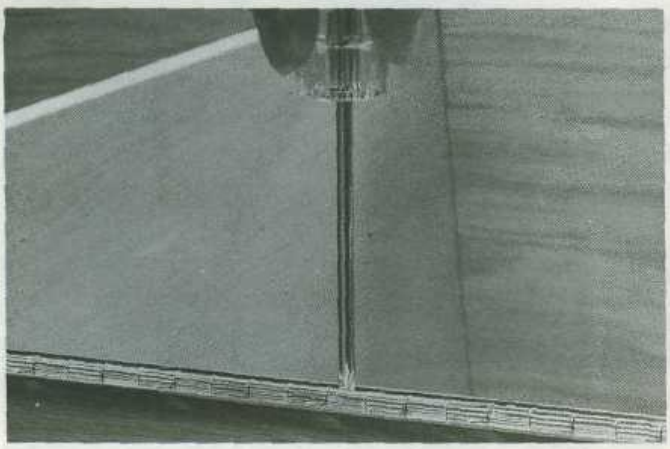

Fig. 25-11. Make pilot holes for hinges slightly under screw size with portable drill; then attach hinge temporarily with end screws for check before proceeding with balance.

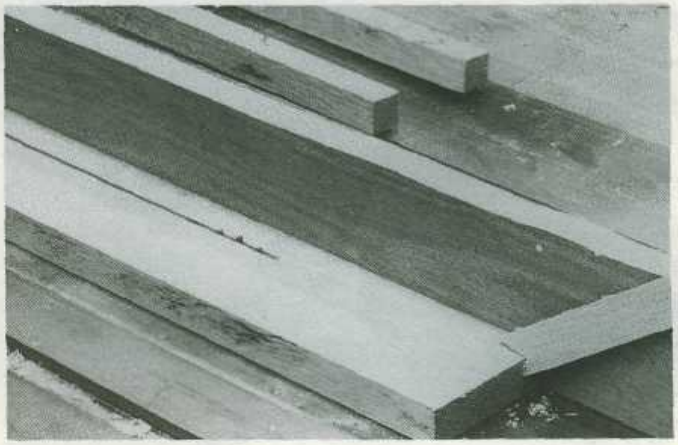

Fig. 25-12. Cutting squares for the handles (refer to drawings). Note push stick in photo.

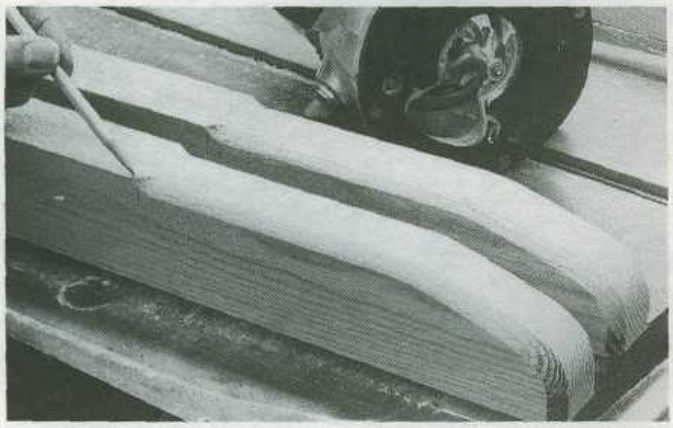

Fig. 25-13. Base pieces are cut from thick stock and then rounded with the router. Round ends where base meets the cabinet, as indicated by pencil in this photograph.

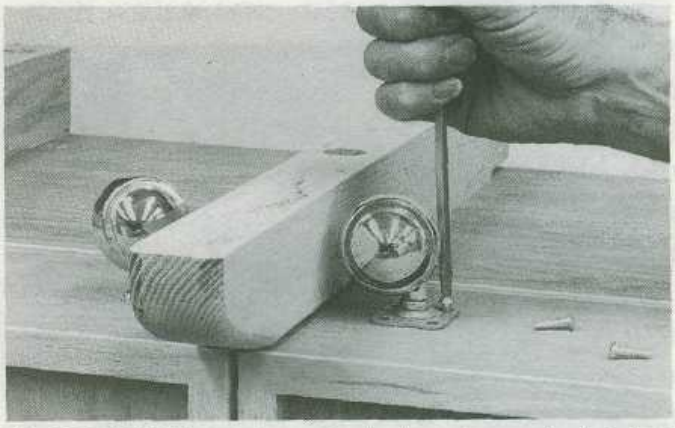

Fig. 25-14. With base pieces attached, casters can be installed with adequate clearance from center base piece. If necessary, you can use shims under caster plates.

securely. *Note*: do not glue in the ¼-inch panel. This should be made to float in the frame or cabinet. The same procedure is followed in making the doors.

Remember when applying clamps to protect the work by using cauls (strips of wood) under the clamps. With the ¼-inch panels in place, the glued-up assembly should be square, but be sure to check for squareness with a large square before the glue sets. Adjust as necessary.

All exposed plywood edges must be concealed. This can be done with veneer tape or with a solid band. The solid band will stand up better and is therefore recommended. Rip the strips from solid stock, making each strip ⅛ × ¾ inches. Let the ends slightly extend the piece to be edged, then measure the pieces carefully and miter the ends. Fit each piece individually, apply glue to the plywood edge and to the back of the band, then fasten with brads.

You can use ordinary brads but "Beauty Brads," especially made for applying molding and edging, are recommended. These very thin brads are made of hardened steel, have no heads, and do not require setting as an ordinary brad does. In use, they are driven into the work

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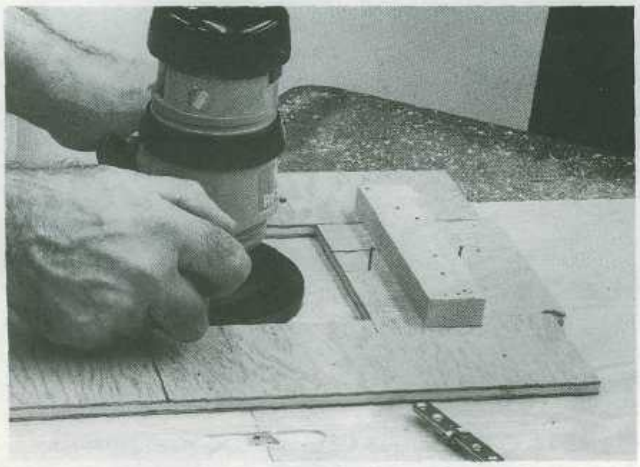

Fig. 25-15. Jig made from ⅜-inch plywood is used to mortise desk top for hinges. Flap and desk top must be butted for this operation. Use a ½-inch straight cutter in router.

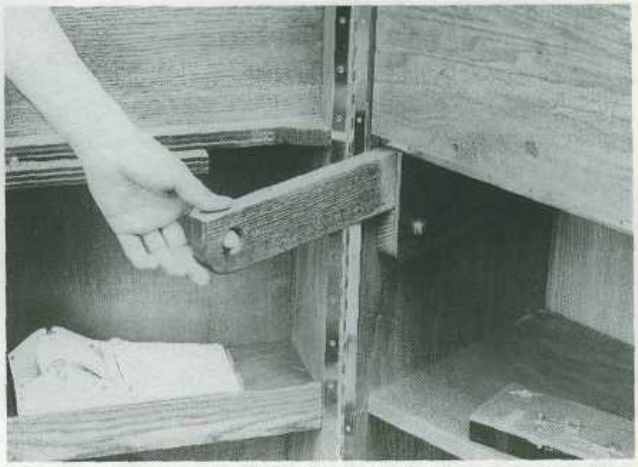

Fig. 25-16. In its retracted position, the desk support clears flap support permitting the door to close. In use, the finger hole is employed to pull out the support for solidity.

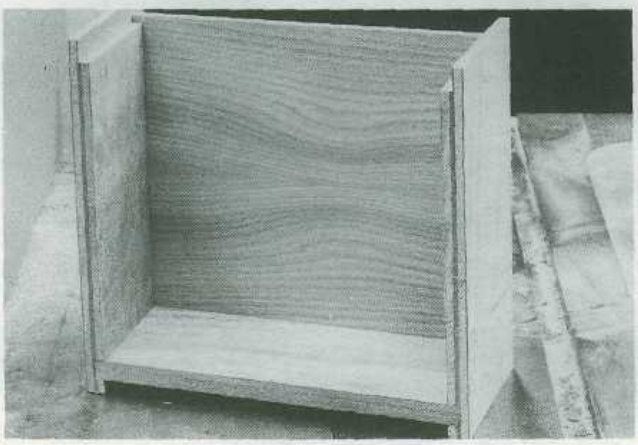

Fig. 25-17. Partially completed drawer. When assembling, insert bottom panel, then glue and brad sides to the subfront and rear. Fronts are fastened in the same way.

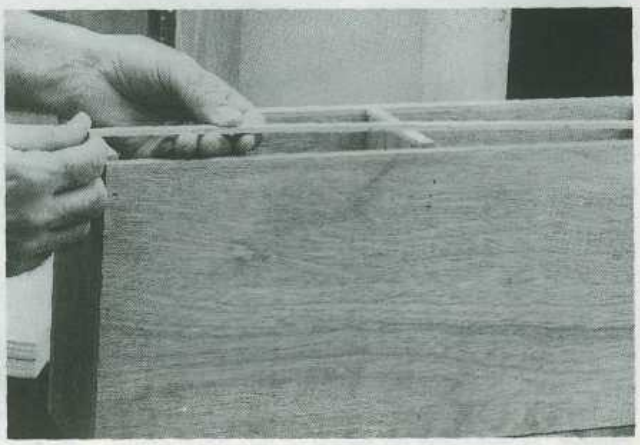

Fig. 25-18. Drawer compartment is constructed of ½-inch plywood with butt joints, as indicated in drawing. Oak edging, ½ inch wide, mitered at ends, is applied to plywood.

leaving about ¼ inch exposed, then are snapped across the grain with a hammer blow to the side. The brad will snap slightly below the surface, thus eliminating the need for setting. Also, the hole left is so small that the finishing materials will usually fill it.

The desktop and flaps are cut as indicated, then the three are placed on a flat surface and the hinge locations are laid out. The hinges used are the flip-top type which permits the flaps to flop 180 degrees. The hinges are ½ inch wide and 2¾ inches long and must be mortised so the tops are flush with the desk top. Use a router fitted with a ½-inch straight cutter.

To ensure accuracy and uniformity, you should use a jig (the one shown is made of ⅜-inch plywood). Make the width of the opening equal to the diameter of the router base and the length of the cutout 2¼ inches longer than the diameter of the router base. Note that the hinge is deeper at the center, thus you will have to mortise this part deeper for clearance.

The flaps and desktop must be aligned

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at the front edge when cutting the mortise. The rear edges of the flaps must match the shelf when the doors are swung open 157 degrees. Because of possible discrepancies, you may have to rework the rear flap edges to obtain a good fit. You can check this after the side doors are hung.

The piano hinges for the doors measure 1½ x 48 inches and the desk hinge measures 1 1/16 x 28½ inches. Install the end and center screws on all hinges and check the fit. If the fit's okay, install the rest of the screws. The plate casters are used under the doors to help take some stress off the door hinges. The casters are installed after the cabinet is mounted onto the base pieces. The base piece height should be the same as the caster height measured from the bottom of the wheel to the top of the plate.

To support the desk flaps, a projection on the door shelves is provided. A locating pin on the shelf prevents the door from swinging away from the flap, which would leave the flap unsupported and place a great strain on the flip-top hinges. Therefore, it is important that whenever the desktop flaps are extended, they must rest on the shelf support provided.

The pins are installed on the shelves as shown. To locate the holes on the underside of the flaps, lower the flaps into place and let the pin point mark the location. A piece of carbon paper placed carbon-side-up on the pin will leave a distinct mark.

The rails near the top of the door fronts serve to break up the monotony of the plain doors and also serve as door pulls. Finger clearance is provided in each piece toward the center. Installed after the staining and finishing operations are completed, they are held firmly by the decorative Tees. No other support is necessary. The finger clearance can be made with a router or shaper. If the proper cutter is not available, you can use a chisel to cut the clearance.

The drawer compartment and drawers are first cut as indicated. The compartment is made of ½-inch plywood with butt joints and oak edging ripped to ½-inch widths is used to conceal the plywood edge. When assembling the drawers, insert the bottom panel, then glue and brad the sides to the subfront and rear. The drawer fronts are fastened to the subfronts with glue and brads. Install the door shelves and large shelf with screws driven through the cleats.

This completes construction. Stain and finish as desired. Try Golden Oak paste wood filler followed by sanding sealer, then clear lacquer. The paste filler stains and fills the open pores of the oak in one operation. In use, the filler is thinned with benzine to the consistency of heavy cream, then is brushed on with the grain. When it starts to set (about 10 minutes) it is rubbed off across the grain using burlap or excelsior. This will work the filler into the pores leaving a smooth surface. Do not do too large an area at one time, for once the filler has set it will be difficult to remove.

Allow the work to dry overnight before applying the sealer coat. Before the sealer is applied, very lightly sand the filled wood then dust with a tac cloth.

When finishing is completed, add the decorative corners and Tees, magnetic catches and brass pulls. The desk supports are also fastened using 1½-inch lag screws.

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MATERIALS LIST

Except as noted, lumber used is ¾" oak plywood. Oak, when specified after the measurement signifies solid oak.

Purpose	Size	Description	Quantity
Side	¾" × 14" × 48"		2
Top	¾" × 14" × 30"		1
Bottom	¾" × 14" × 30"		1
Rear	¼" × 29" × 47"	Oak plywood	1
Desktop rear	¾" × 12¼" × 29"		1
Shelf	½" × 12" × 28½"	Oak plywood	1
Shelf edge	⅛" × ¾" × 28½"	Oak	1
Shelf cleat	¾" × 1½" × 11"	Oak	2
Stop	¼" × ¾" × 3½"	Oak	1
Base	1¾" × 2⅝" × 24"		3
Desktop forward	¾" × 20½" × 28¼"		1
Flap	¾" × 14" × 19¼"		2
Support, movable	¾" × 2½" × 18"	Oak	2
Support, fixed	¾" × 2 7/16" × 12¼"	Oak	2
Support, side	¼" × 5" × 12¼"	Plywood	2
Drawer box top	½" × 9" × 28½"	Oak plywood	1
Drawer box bottom	½" × 9" × 28½"	Oak plywood	1
Drawer box side	½" × 4¼" × 9"	Oak plywood	4
Drawer rear	½" × 4" × 8 3/16"	Oak plywood	3
Drawer subfront	½" × 4" × 8 3/16"	Oak plywood	3
Drawer front	¾" × 4⅛" × 8 11/16"	Oak plywood	3
Drawer side	½" × 4" × 8¼"	Oak plywood	6
Drawer bottom	¼" × 7 7/16" × 8 3/16"	Oak plywood	3
Door side	¾" × 6" × 48"		4
Door top	¾" × 6" × 15"		2
Door bottom	¾" × 6" × 15"		2
Door front	¼" × 14" × 47"		2
Door handle	¾" × ¾" × 13½"		2
Door shelf	¾" × 5¼" × 13½"		2
Separator front	¼" × 7⅜" × 13 7/16"	Oak plywood	2
Separator rear	¼" × 10" × 13 7/16"	Oak plywood	2
Flap support	¾" × 5½" × 8½"		2
Pin	5/16" × 1"	Dowel	2
Shelf lower	½" × 4¾" × 13½"		2
Shelf edge	¼" × 2¼" × 13½"	Oak plywood	2
Shelf cleat	¾" × 1½" × 4¾"		4
Plywood edging	⅛" × ¾"	Oak	65'
Hinge door	1½" × 48"		2
Hinge desk	1 1/16" × 28½"		1
Hinge, flip-top	½" × 2¾" (FTT)		6
Corner	(AC)		8
Tee	(AT)		4
Knob	(Knob)		5
Magnetic catch	(PM)		2
Caster, plate	2½"		2
Screw	1½" × 8 RH		20
Screw	1" × 8 FH		8
Lag screw	5/16" × 1"		2
Lag screw	5/16" × 1½"		4
Beauty Brads	(BBDS)		1 pk.
Brads	1"		12

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Lightweight Desk

BUILDING THIS handsome desk is a project that any good craftsman can undertake with confidence. The design could be modified, if so desired, by substituting drawers for a cabinet on the pier.

Start construction by edge-gluing 1-inch stock birch from the top. Clamp and let dry, then plane all the joints and sand to a smooth finish. Cut the shape of the top with a band saw or saber saw, then sand all edges smooth. Next glue-up the stock for the pier section, and sand and plane it. Cut to size, then cut rabbet on bottom edge of sides and back and on back edges of sides. Cut a bottom piece to fit in the rabbet.

Bore upper cleats for No. 10 1½-inch flat-head wood screws, then glue and screw cleats in place, setting them in 1/16 inch from the edges so that when pieces are assembled they will draw up tight at the joints. Assemble the pier section with glue and screws, squaring assembly and then fastening bottom in place with screws.

Install a shelf in the pier section, and hang the door on butt cabinet hinges, with a magnetic catch and brass knob. Cut the pier base pieces to size, mitering corner joints. Bore for No. 11 1½-inch flat-head screws, apply glue, and assemble with corner blocks, making sure it is square. Now fasten base to pier.

Cut the stock for the leg assembly and stretchers. Bore holes for 7/16-inch dowels 2 inches long. Assemble with glue, clamping until glue has set. Remove clamps and plane and sand all joints flush,

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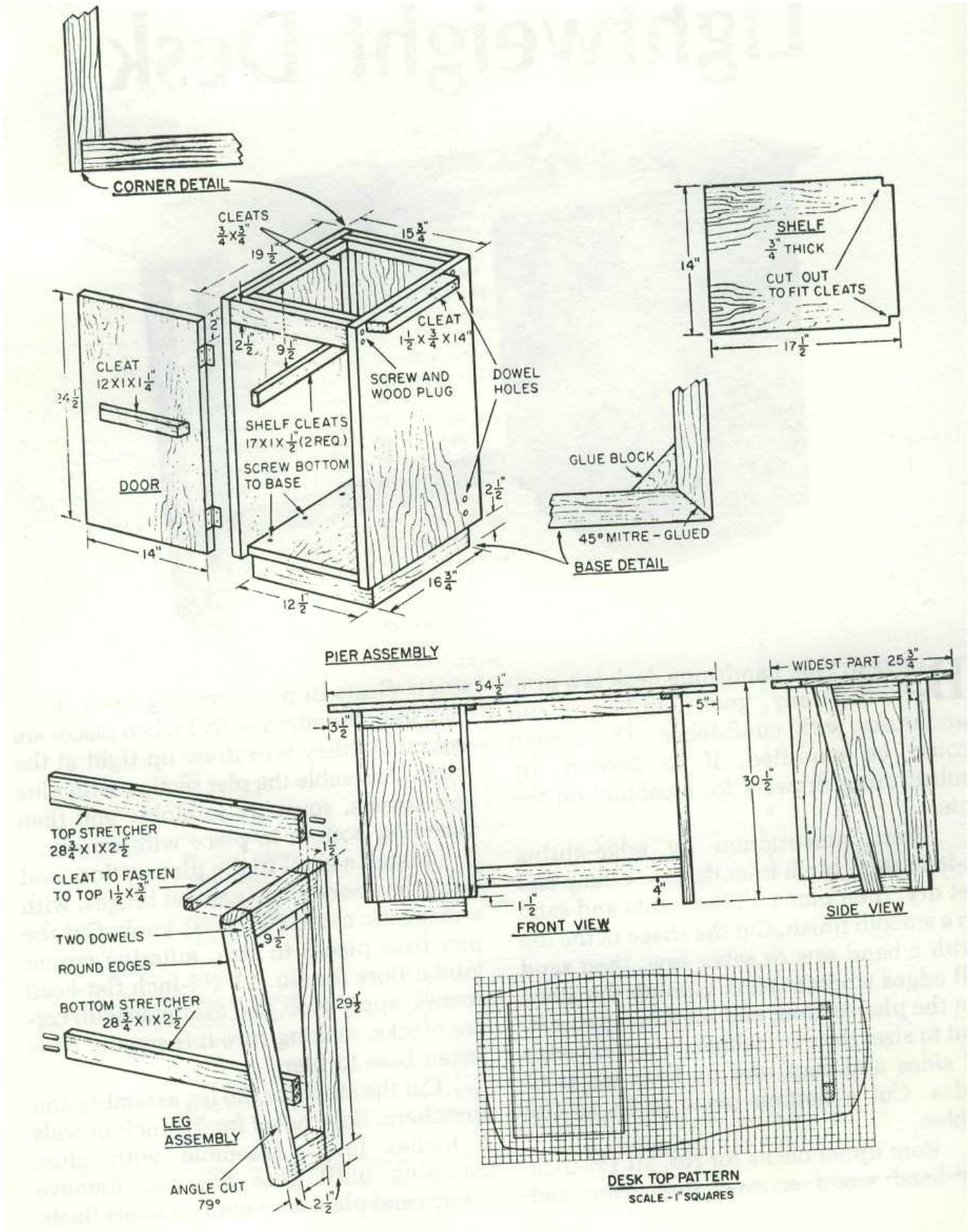

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MATERIALS LIST

Purpose	Size	Description	Quantity
Top	1″ × 12″ × 12′	Birch stock	1
Pier and shelf	¾″ × 12″ × 10′	Birch stock	1
Stretchers	1″ × 2½″ × 60′	Birch	1
Support	1½″ × 2½″ × 80″	Birch	1
Dowels	2″ × 7/16″		16
Wood screws	1¼″	No. 10 FH	as needed
Wood screws	1½″	No. 11 FH	as needed
Wood screws	2½″	No. 10 FH	as needed

then round the front edge of the leg. Fasten a cleat to the top piece of the leg for fastening to the top.

Bore two holes through the top stretcher for No. 10 2½-inch flat-head screws. Plane and sand stretchers. Bore holes for 7/16-inch dowels in stretchers, pier, and leg, place glue in holes and assemble pier, leg, and stretchers. Clamp square in all directions.

Place the top upside down, then place the leg and pier assembly on the top. Square and fasten all cleats and the upper stretcher to top, then sand again. Stain to the desired shade, apply a coat of sealer, sand lightly, and apply a finish coat of lacquer.

The trim, modern appearance of this desk will make it a welcome piece of furniture as well as a useful accessory in the living room, bedroom, or den.

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Magazine Table

YOU DON'T NEED any fancy equipment to build this fine magazine end table. The Italian provincial legs look difficult to build but indeed they are not. A glance at the drawing reveals that they are built up using a technique called post blocking. This eliminates the almost impossible task of accurately cutting the narrow section between posts with conventional home shop equipment. A simple method of fluting the legs is also utilized to further enhance the project.

Lumber used was pine, but any suitable wood will do. For a stained or natural finish, you may want to try mahogany, cherry or maple. Walnut may also be used—if you can get it. This fine cabinet wood is becoming rare.

Start construction with the legs. These are cut from 2-inch stock. Set the table saw fence for a 1⅝-inch cut then rip the stock to produce a block 1⅝ inches square. After cutting, sand the surfaces or, if you have a jointer, run a pass on each surface to eliminate the kerf marks of the saw. If the jointer is to be used, make the saw cut a trifle more than 1⅝ inches to allow for stock removal on the jointer. After ripping and smoothing the surface, cut the legs to size and taper the lower ends.

The best way to taper the legs is to use a jig on the table saw. The jig consists of a piece of plywood notched out to hold a leg. The notch is positioned at an angle so that when the jig with a leg in place is fed through the saw, a thin wedge section is ripped off the end of the leg. Repeat this operation on all four sides to produce the tapered leg. The angle of the notch determines the amount of taper. This setup can be used for other projects where numerous tapered cuts are required.

The next step is the fluting of the legs. Here again a jig is used for both accuracy and simplicity. The router is mounted to a wooden platform which converts it to a mini shaper. The cutter is made to protrude through the top of the platform to which a fence has been attached. The work is simply held against the fence and fed through

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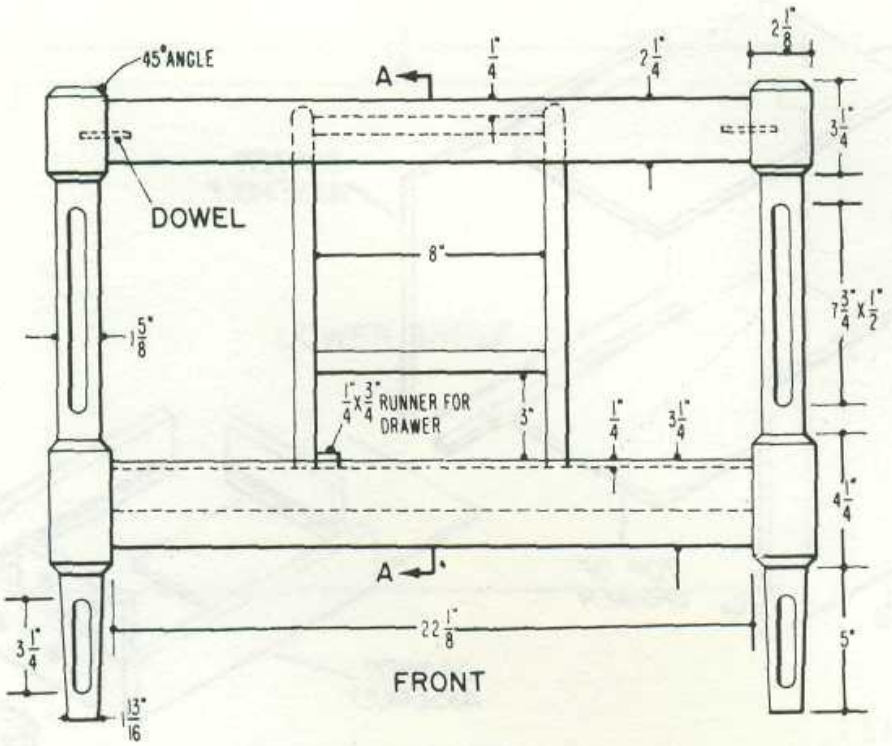

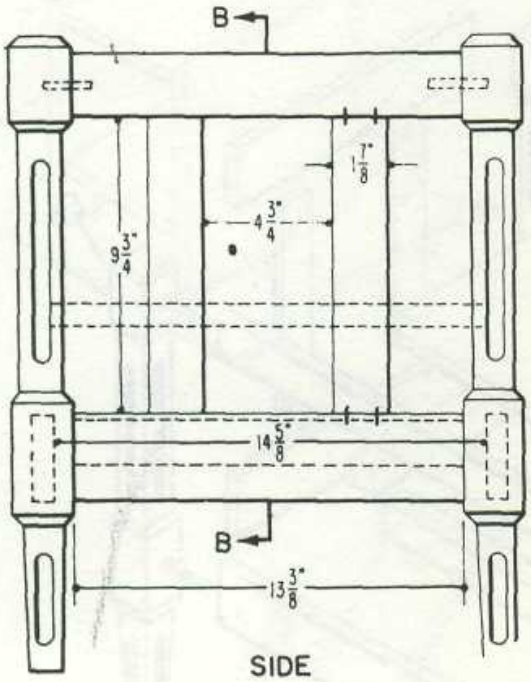

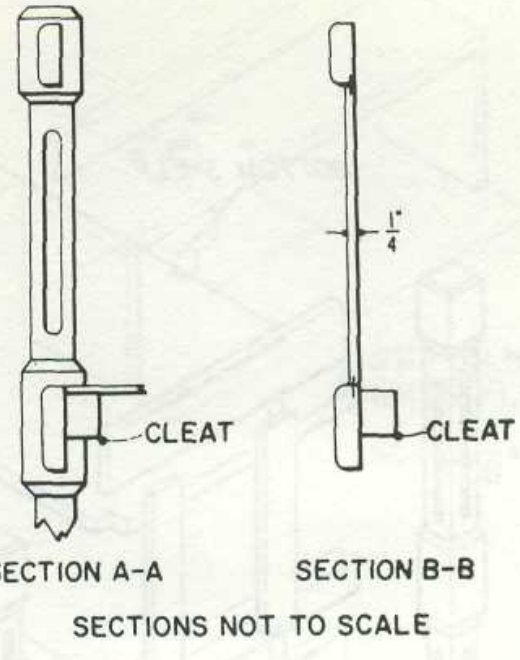

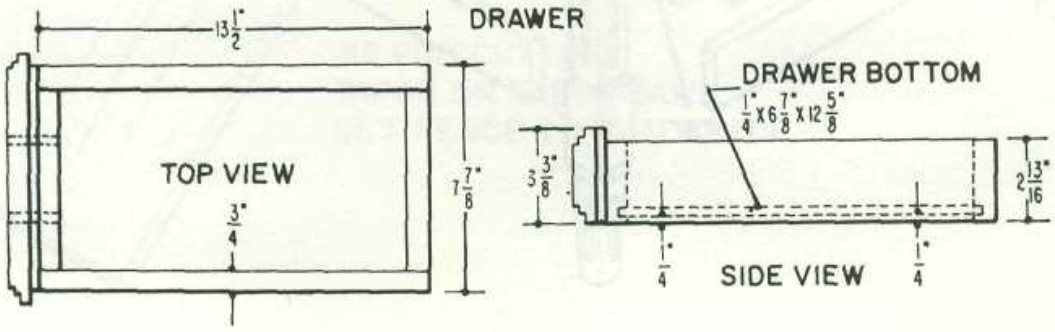

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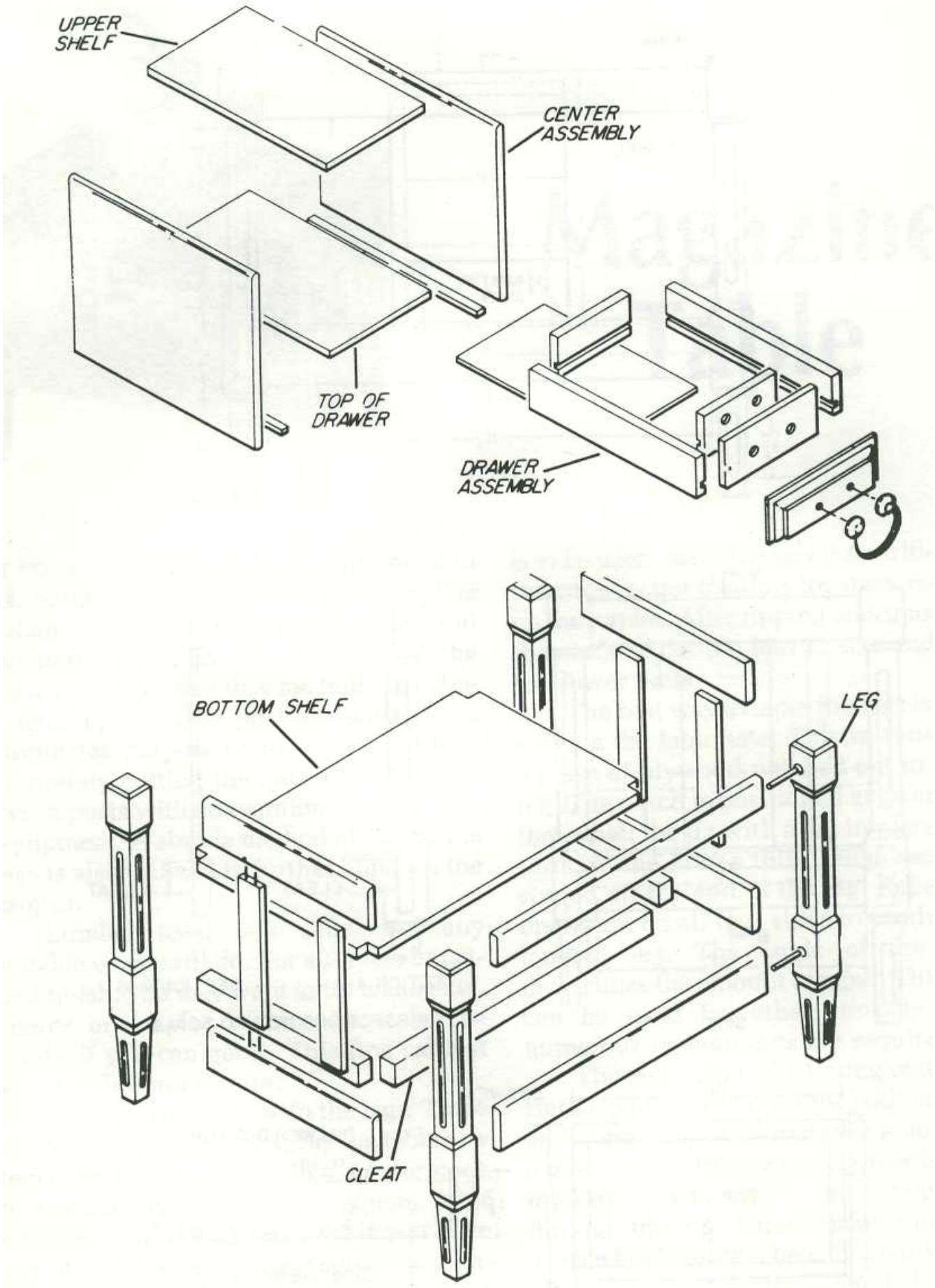

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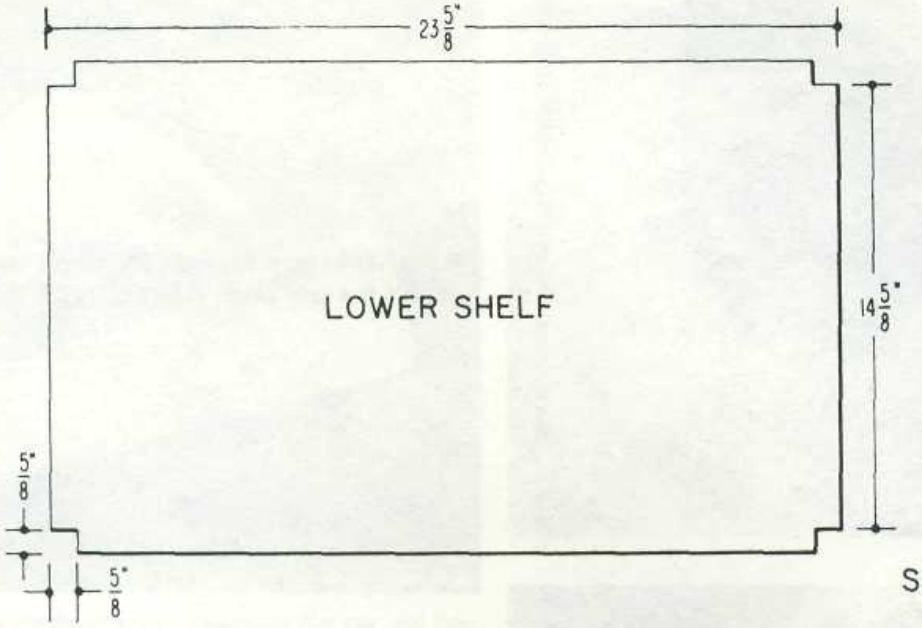
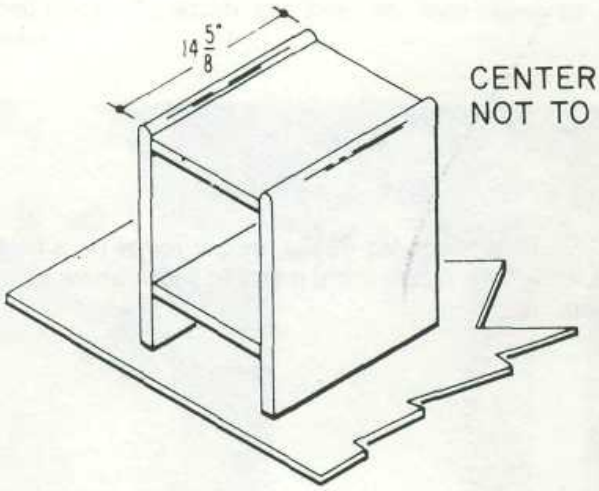
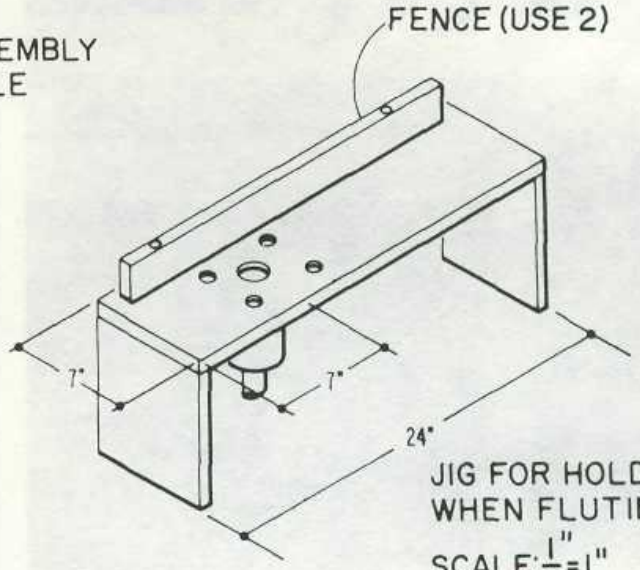


SCALE: 1" = 1"

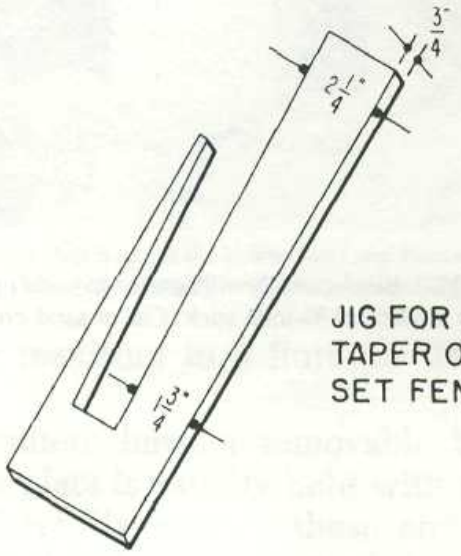


CENTER ASSEMBLY
NOT TO SCALE



JIG FOR HOLDING
WHEN FLUTING

SCALE: 1" = 1"



JIG FOR CUTTING
TAPER ON TABLE SAW
SET FENCE 4" FROM BLADE

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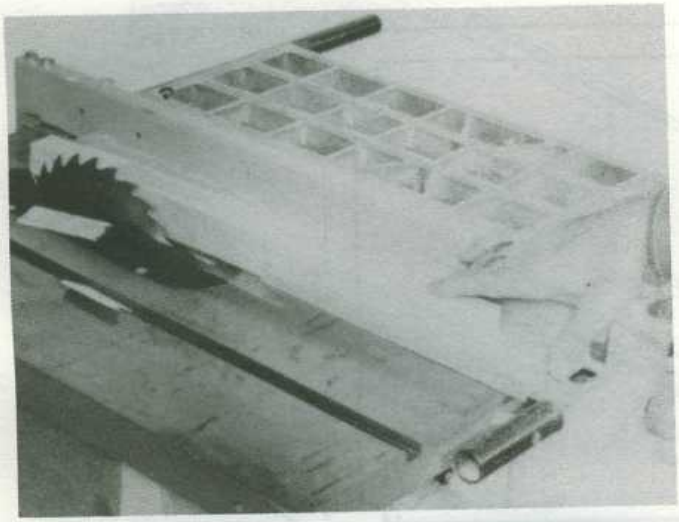

Fig. 27-1. To taper leg ends, use a table saw jig. Jig is positioned so that the saw blade cuts the leg block at a slight angle.

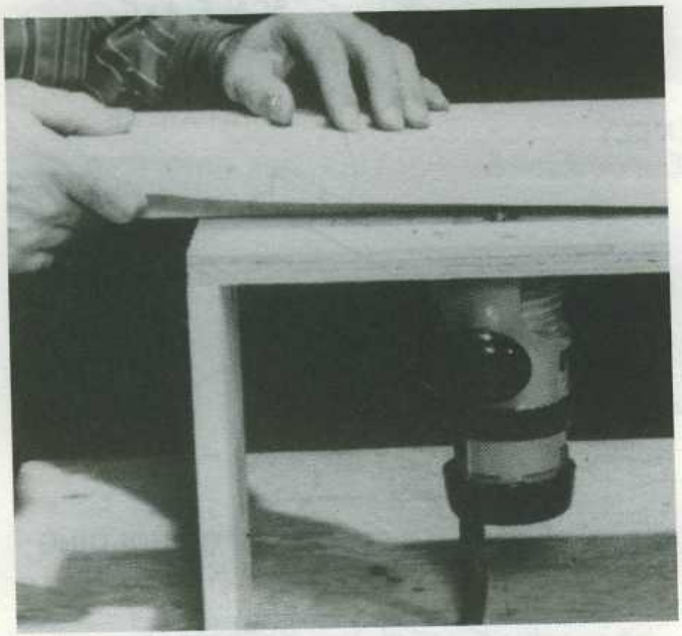

Fig. 27-2. To produce leg fluting, mount router on a frame. Lower work onto cutter, using marks to show where to start and stop.

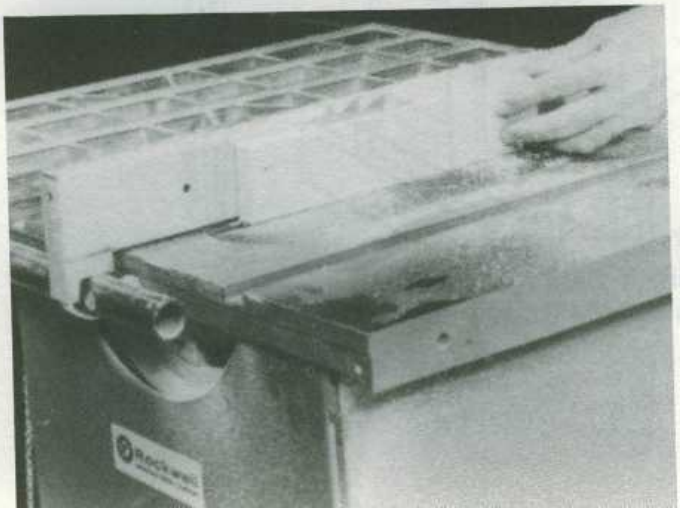

Fig. 27-3. Blocks which will be used to build up legs are ripped from a piece of ¾-inch stick. Cut or sand ends to 45-degree angle.

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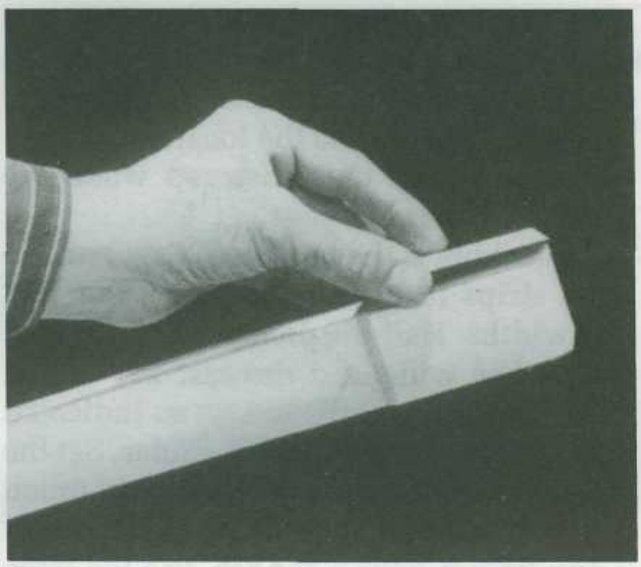

Fig. 27-4. The legs are built up by attaching the cut and beveled pieces. To attach, use glue, and then clamp for a good bond.

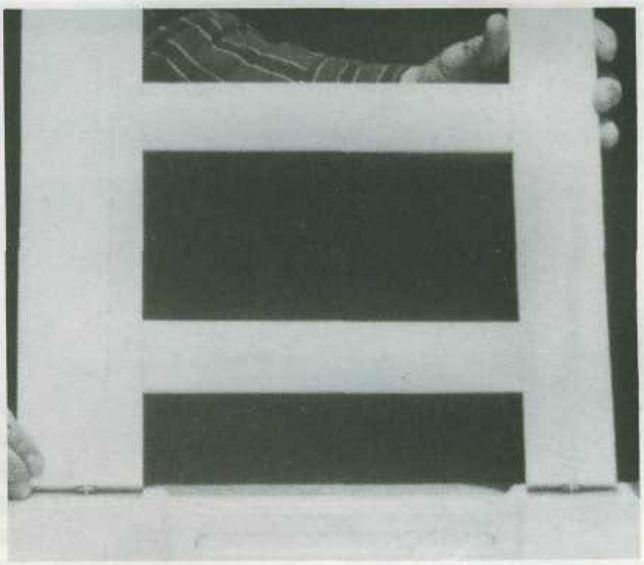

Fig. 27-5. The apron pieces are joined to the legs with dowels. Use dowel locating pins to accurately transfer the hole positions.

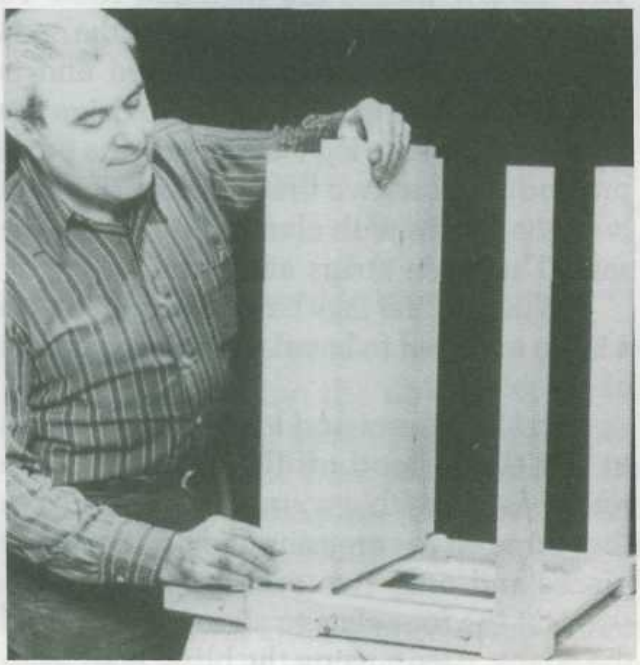

Fig. 27-6. The next step is to cut the lower shelf and then install using cleats on underside. Attach it with dowels to legs.

Fig. 27-7. Drawer and top shelf section is built as a unit and installed separately. Assemble with nails, sinking the heads.

the cutter resulting in a flute (or flutes) being cut.

All routers have a removable base plate. The plate is usually held with four screws. Carefully remove these and set aside. Place the plate on a piece of plywood and use a pencil to locate the mounting holes as well as the center opening. Drill the holes for the screws countersinking the heads. The center hole should be large enough to clear the cutter being used. See the drawing for clarification. Make the legs

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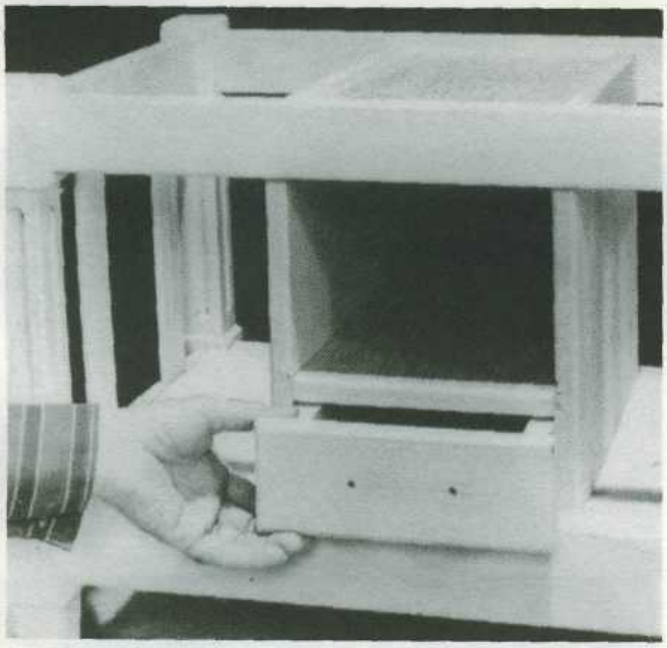

Fig. 27-8. Make drawer with a double front and be sure to make screw clearance holes in subfront so hardware can be installed.

of the platform tall enough so that the bottom of the router will clear the workbench.

Mount the flute cutter in the router, then, using the four screws removed from the router base previously, mount the router in place. Position the fence so that the flute will fall exactly in the center of the leg. Although only one fence is shown for clarity in the photograph, a double fence is recommended to keep the workpiece from swaying.

Some routers are not made with lock-on switches—especially the pistol-grip type. If you have one of these, you will have to have an assistant turn on the power as needed, or you can improvise by taping the switch "on" with masking tape. You can then operate the machine by using the plug as a switch. If you use this method, be sure to remove the tape as soon as the job is done.

Since the flutes are "blind" (they do not run off the edge of the work), you will have to lower the work onto the cutter and likewise lift it off at the end of the cut. Do this by placing "start" and "stop" marks on the jig. Determine the location of these by making trial cuts in scrap wood the same length as the legs.

Blocking is the next step. Saw ¼-inch-wide strips from suitable stock, then rip two widths. Half the pieces will be ripped 1⅝ inches wide and the rest 2⅛ inches wide. Cut the lengths to size as indicated then bevel the edges on the sander. Set the table for a 45-degree bevel then just touch the work to the disc to produce the bevel. If you do not have a sander, use the table saw to make the bevel.

Glue the strips to the legs as shown. The narrow pieces are installed first. To keep the pieces from shifting, snip the ends of 18 gauge brads so the pointed end is about ¼ inch long. Use a plier to drive the blunt end into the leg leaving just the point protruding. Use two brads per section and hold the pieces with clamps while the glue sets. The wide strips are installed last.

When all the legs have been glued, use a knife or chisel to bevel the square corners of the blocks.

Cut the upper and lower apron pieces to size then round off the edges with the router fitted with a rounding cutter. Note that three edges are rounded on the upper pieces and only two on the lower.

Cut the four slats to size and round off the edges. Again using the blind brad technique, install the slats to the upper and lower apron ends. This time make the brads longer (about ½ inch) and allow them to protrude about ¼ inch. Apply glue and working on a flat surface, bring the parts together. Clamp until the glue sets.

The apron pieces are joined to the legs with dowels. One dowel in each section

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MATERIALS LIST

All lumber used is pine (except where noted).

Purpose	Size	Quantity
Lower shelf	3/4" × 14 5/8" × 23 3/8"	1
Cleats	3/4" × 1" × 12"	2
Cleats	3/4" × 1" × 21"	2
Apron (lower)	3/4" × 3 1/4" × 22 1/8"	2
End apron (lower)	3/4" × 3 1/4" × 13 3/8"	2
Apron (upper)	3/4" × 2 1/4" × 22 1/8"	2
End apron (upper)	3/4" × 2 1/4" × 13 3/8"	2
Legs	1 5/8" × 1 5/8" × 21 1/2"	4
Blocks	1/4" × 1 5/8" × 3 1/4"	8
Blocks	1/4" × 2 1/8" × 3 1/4"	8
Blocks	1/4" × 1 5/8" × 4 1/4"	8
Blocks	1/4" × 2 1/8" × 4 1/4"	8
Slats	1/4" × 1 7/8" × 9 3/4"	4
Compartment slides	3/4" × 12" × 14 5/8"	2
Upper shelf	3/4" × 8" × 14 5/8"	1
Drawer roof	3/4" × 8" × 14 5/8"	1
Drawer sides	3/4" × 2 13/16" × 13 1/2"	2
Drawer ends	3/4" × 2 13/16" × 6 3/8"	2
Drawer front	3/4" × 3 3/8" × 8 3/4"	1
Drawer bottom	1/4" × 6 7/8" × 12 5/8"	Plywood
Dowels	3/8" × 2"	16
Pull	3" centers	

will suffice. Use dowel-locating pins to accurately position the dowels. A dowel drilling jig is first used on the apron ends. Hole positions are then transferred to the legs by means of the pins. (See photo.) Next cut the shelf and install it using cleats on the underside.

The drawer and top shelf compartment is made as a unit and installed separately. Set the lower shelf down about 1/4 inch and likewise the upper shelf is set down from the top the same amount.

Make the drawer with a double front as shown and be sure to make screw clearance holes on the subfront so that the hardware can be installed after the finishing operation is completed.

The front edge of the drawer is shaped with a beading cutter.

Sanding and finishing operations complete the project. To facilitate the finishing, the compartment may be lifted out and installed after the finishing is completed.

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TEA CABINET

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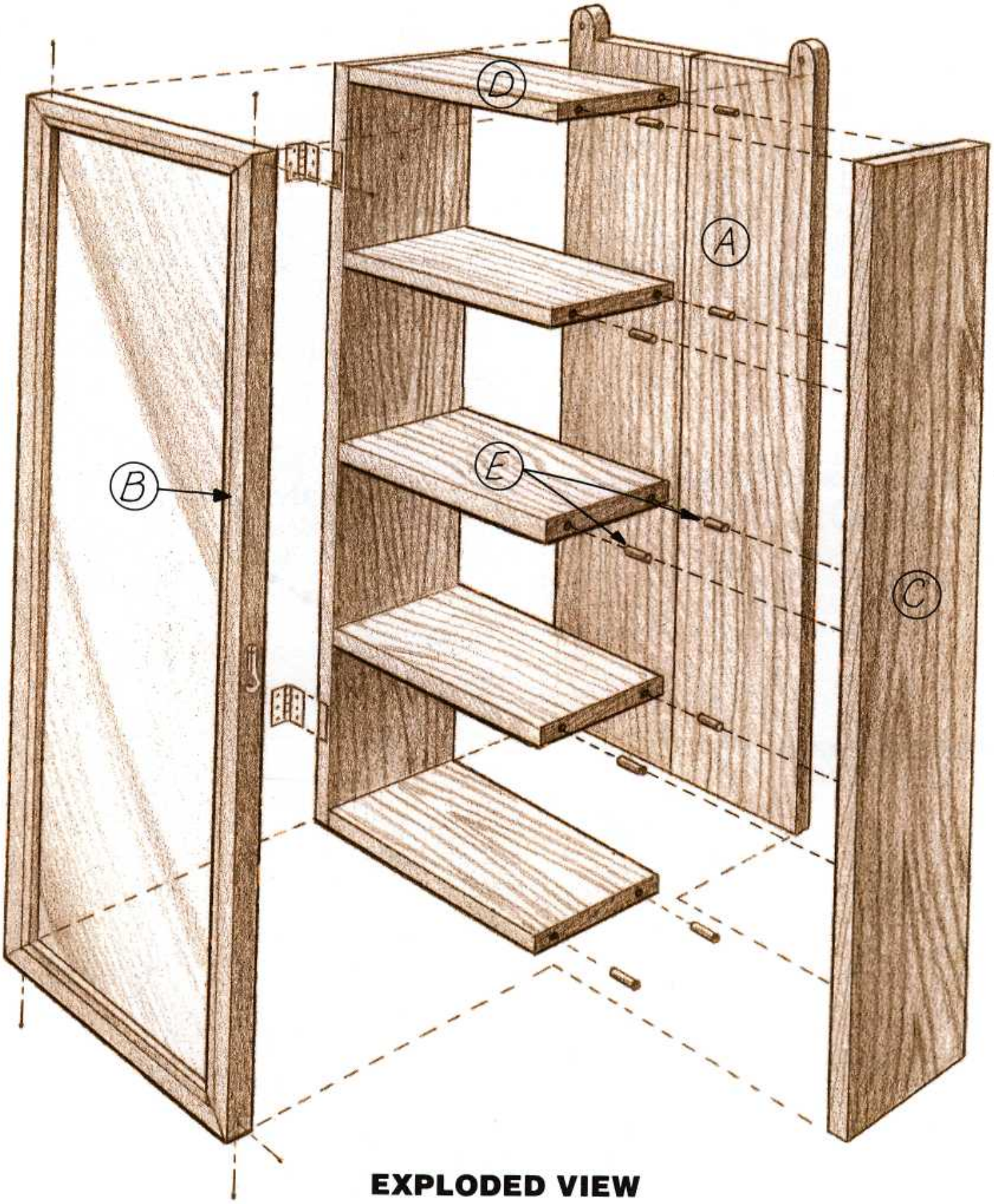

EXPLODED VIEW

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1 Select the stock and cut the parts. Choose straight, flat stock. Joint, plane, rip, and cut the parts to the sizes given in the Cutting List.

2 Cut the hangers in the back boards. The back is longer than the cabinet sides and is cut away to create the hangers shown in the *Front View.* Lay out and cut the hangers to the profile shown. When you have cut the hangers, drill a ¼-inch-diameter hole through them, as shown.

SHOP TIP: To get two identical hangers, cut both at once. First stack the pieces together and secure by putting double-sided tape between them. Then cut both hangers in one operation.

3 Rabbet the backs, door stock, and sides. Put a rabbeting bit in your router. Secure the router in a router table. Put a fence on the table and adjust the setup to rout a ¼ × ¼-inch rabbet. Cut a rabbet in one edge of each back board positioned so that the rabbets will overlap as shown in the *Top View.*

With the router still set up for the ¼ × ¼-inch rabbet, rabbet one edge of the door stock to hold the door glass.

After you cut rabbets in the back boards and door stock, set the router table to rabbet each side to accept the back. Rout the ⅜ × ¼-inch rabbet as shown in the *Top View.*

4 Drill the dowel-pin holes. Lay out the sides for the dowel-pin holes following the dimensions shown in the *Side View.* Drill the ¼-inch-diameter by ¼-inch-deep dowel-pin holes on your drill press.

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Back boards	2	⅜" × 4¼" × 23¼"	
B. Door stock	1	¾" × ¾" × 64"	Miter to fit.
C. Side	2	½" × 4½" × 22"	
D. Shelves	5	½" × 4⅛" × 7¾"	
E. Dowel pin stock	1	¼" dia. × 15"	Makes 20 7/16" pegs

Hardware

2 1-in. butt hinges
1 latch hook. Available from Meisel Hardware Specialties, P.O. Box 70, Mound, MN 55364. Part #309.
1 ⅛-in. × 7 11/16-in. × 20 15/16-in. piece of glass
As needed, 1" brads
As needed, pushpins (to hold glass in place)

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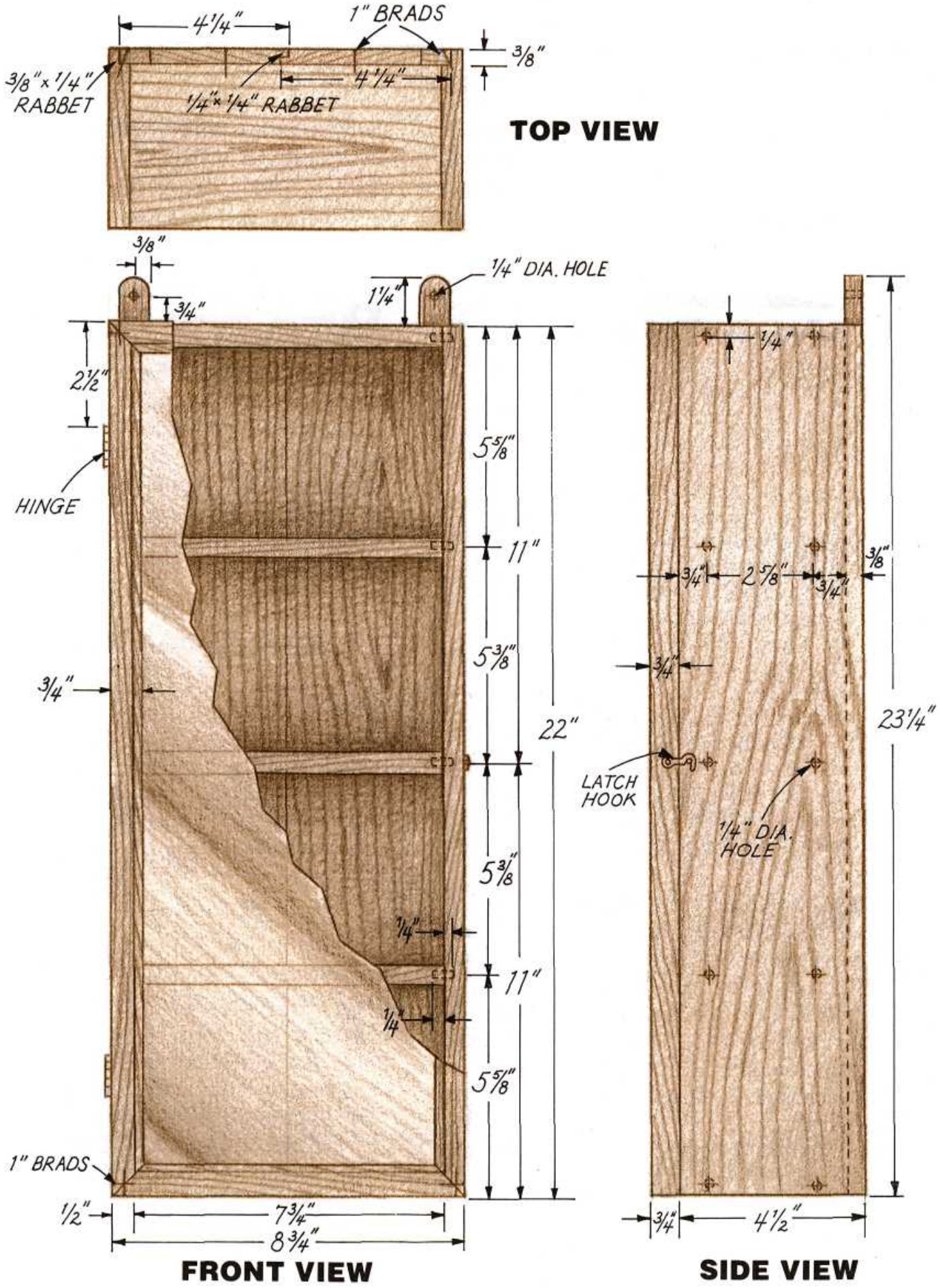

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Locate the exact dowel-pin hole positions on the ends of the shelves with dowel centers. Put the shelves upright in a vise and carefully drill the dowel-pin holes.

SHOP TIP: Drill the dowel holes with the help of a template. Make the template from some scrap wood cut to the exact dimension of the sides. Lay out and drill the dowel-pin holes, shown in the *Side View,* on the template. Clamp the template to the cabinet side. Drill through the holes in the template to locate the holes in the sides.

To make an identical set of holes on the second side, mark the front and top edges of the template and make sure these marks line up with the top and front of the second side. Clamp the template in place on the second side and drill the matching dowel-pin holes.

Drill the holes in the shelves using the top set of holes in the template. Put the shelf in the vise, align the top of the template with the top of the shelf, and drill through the template holes.

5 Assemble the cabinet. Cut ¼-inch-diameter dowel stock into 7/16-inch-long dowel pins with a dovetail saw. Glue the dowel pins into the holes in the shelf ends. While the glue is still wet, glue the shelves and dowels into the sides. Clamp the sides to the shelves, make sure the cabinet is square, and allow the glue to dry.

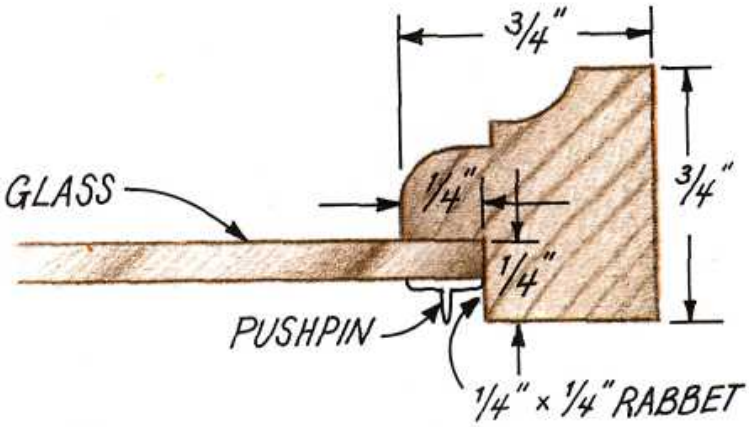
When the glue has dried, remove the clamps and test fit the back boards. The back boards should have approximately 1/16 inch of play from side to side. Trim if necessary.

When the back boards fit properly, apply glue to the rabbets cut for the backs. Put the back boards in place and nail them to the cabinet with 1-inch brads. Nail, but do not glue, the back boards to the shelves.

Allow the glue to dry.

6 Cut the profile in the door stock. Put a 1 5/16-inch-diameter cove and bead bit in the router. Secure the router in a router table. Before you cut the door stock, cut a test profile in some scrap wood. Cut the scrap to the thickness and width of the door stock. Adjust the height of the bit to approximate the profile shown in the *Door Stock Detail.* When you are satisfied with the scrap profile, rout the profile in the door stock.

DOOR STOCK DETAIL



7 Miter the door stock and assemble the door. When you miter the door stock to make the door, cut the miters one at a time and compare them to the front edge of the cabinet for accuracy.

When you've cut all four sides of the door frame, apply glue on the mitered ends and clamp the door together in a corner clamp. With the door frame still in the clamp, tack the miters together with 1-inch brads.

Allow the glue to dry.

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SHOP TIP: To get accurate miters, check your setup on some pieces of scrap. Set your table saw blade to the 45-degree position. Set a miter gauge to 90 degrees and use it to cut miters in two pieces of scrap wood. Put the miters together and make sure that the resulting angle equals 90 degrees. Adjust the blade as necessary.

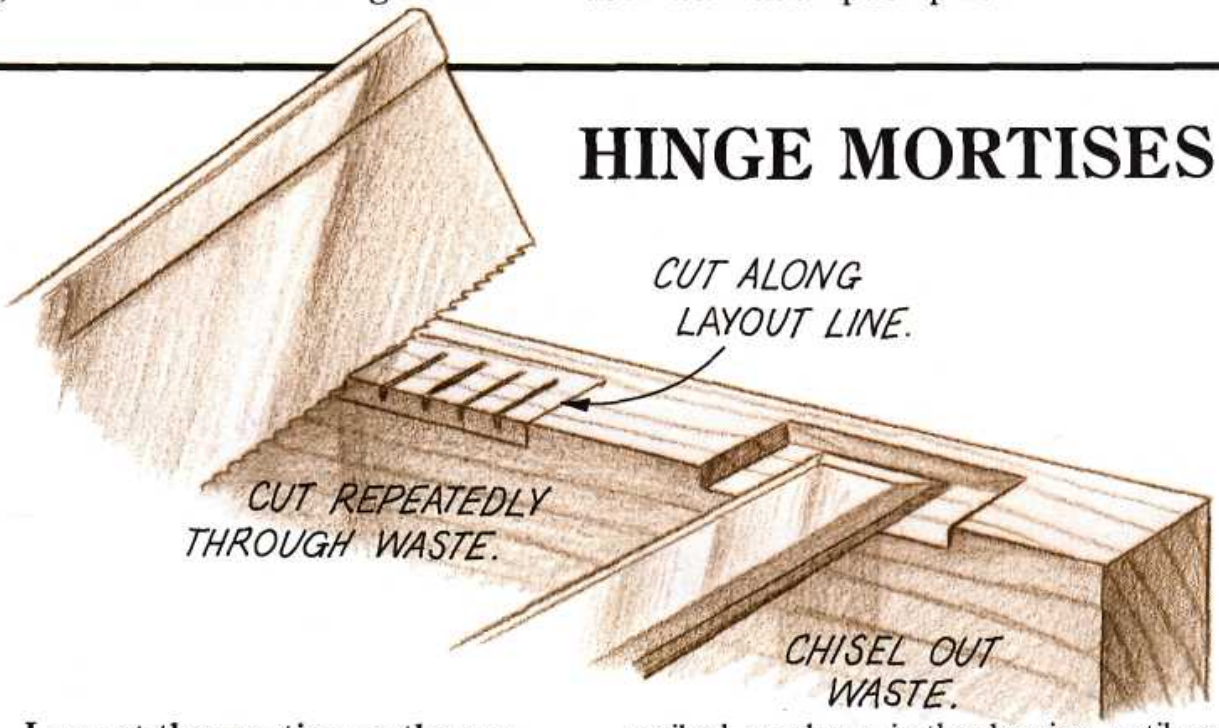
8 Cut the hinge mortises and hang the door. With the hinge as your guide, mark and cut the hinge mortises in the front edge of the cabinet and the back of the door as shown in the *Front View.* Rout the mortises or cut by hand.

Mark and predrill holes for the hinge screws, then hang the door.

9 Apply finish. Set the brads and fill any brad holes with wood putty. Finish sand all the surfaces.

The tea cabinet shown has an oil finish. Finish your cabinet as you choose. After the finish has dried, screw the latch hook in place and install the glass in the door with small push pins.

HINGE MORTISES



1 Lay out the mortise on the carcase. To cut accurate mortises, lay them out directly from the hinge. Put the hinges in place on the cabinet and trace around one of the leaves with a knife.

The mortise depth should equal half the thickness of the hinge barrel. Scribe a line with a marking gauge to mark the depth of the mortise.

2 Remove the waste. With a backsaw or dovetail saw, cut along the first line you scribed, as shown in the drawing, until you reach the scribe line indicating the mortise depth. Make a series of cuts in the mortise, as shown, and chisel out the waste.

3 Lay out the mortise on the door. Put the hinge in the mortise and position the door on the cabinet. Mark where the hinge barrel meets the door. Remove the door from the cabinet; align the hinge with the barrel marks on the door. Trace around the hinge and remove the waste as before.

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DISPLAY CABINET

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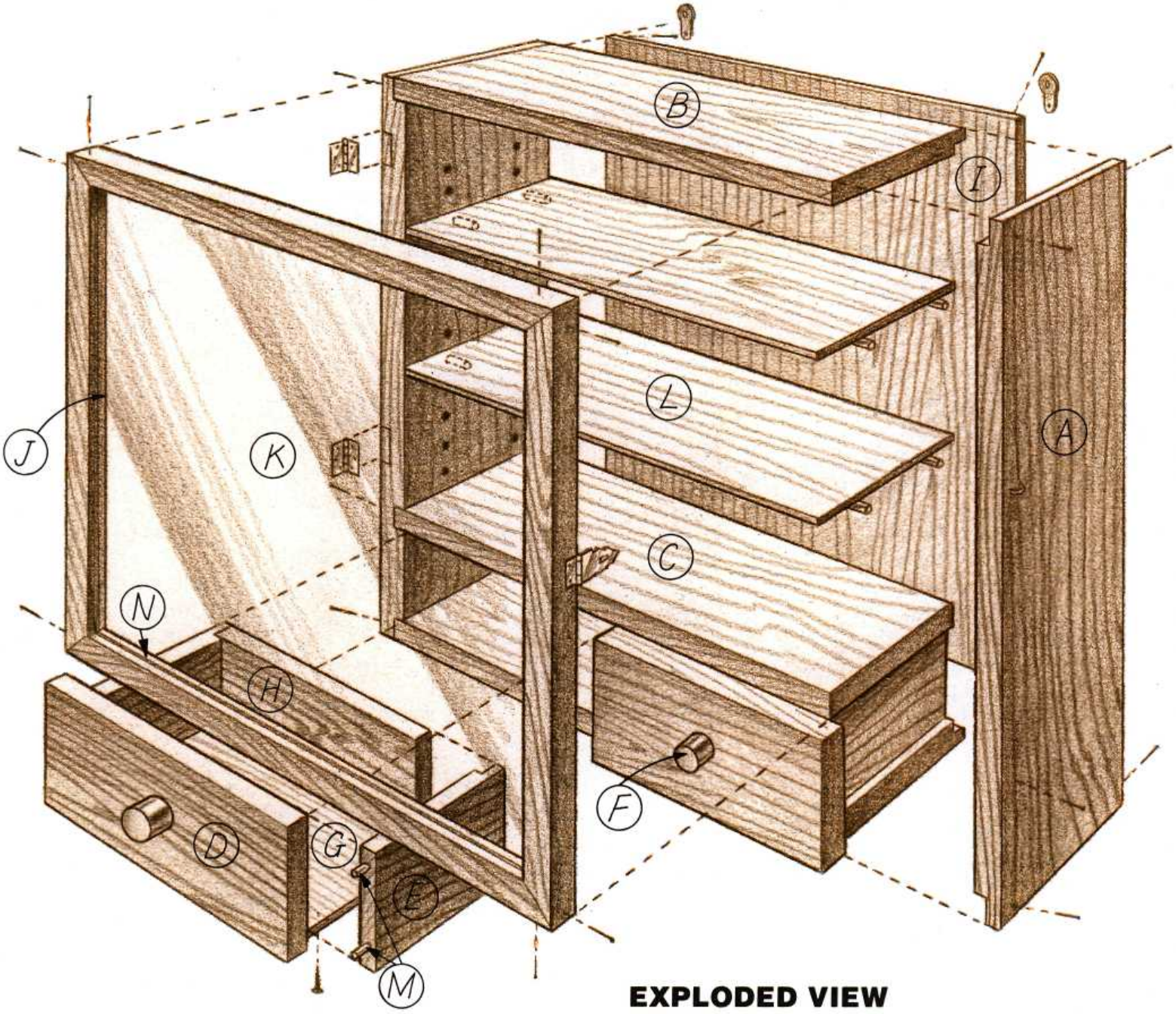

EXPLODED VIEW

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1 Select the stock and cut the parts. Choose straight, flat stock. Select a cabinet-grade plywood for the back that will match the cabinet's solid wood. Cut the plywood back so that its grain runs parallel with the cabinet sides.

Joint, plane, rip, and cut the parts to the sizes given in the Cutting List.

2 Cut the dadoes and rabbets in the sides. Put a ¾-inch straight bit in your router and rout the dadoes and rabbets shown in the *Front View* and *Side View.*

SHOP TIP: To rout a dado or rabbet, clamp a straightedge to the stock and guide the router against it. This will produce a perfectly straight groove and will also give you more control over the router.

3 Rout a rabbet for the back. Set up a router table and fence to cut a ⅜ × ¼-inch rabbet. Cut a rabbet in the back edge of the sides, top, and bottom.

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Sides	2	¾″ × 4¾″ × 19¾″	
B. Top and bottom	2	¾″ × 4¾″ × 15¼″	
C. Drawer shelf	1	¾″ × 4½″ × 15¼″	
D. Drawer fronts	2	¾″ × 3$^{11}/_{16}$″ × 7$^{15}/_{16}$″	
E. Drawer sides	4	½″ × 2$^{11}/_{16}$″ × 4½″	
F. Drawer pulls	2	¾″ dia. dowel × 1¼″	
G. Drawer bottoms	2	¼″ × 4½″ × 7$^{3}/_{16}$″	Plywood
H. Drawer backs	2	½″ × 2$^{11}/_{16}$″ × 6$^{11}/_{16}$″	
I. Cabinet back	1	¼″ × 15¼″ × 19″	Plywood
J. Door stock	1	¾″ × 1″ × 70″	Miter to fit.
K. Door glass	1	⅛″ × 14⅝″ × 14⅝″	Cut to fit.
L. Glass shelves	2	¼″ × 4½″ × 14$^{7}/_{16}$″	Cut to fit.
M. Dowel pin stock	1	¼″ dia. × 4″	Cut to size.
N. Glass bead	1	¼″ quarter round × 65″	Miter to fit.

Hardware

2 1½ × 1¼-in., open dia. hinges
As needed, 4d finishing nails
8 #4 × ⅝-in. flathead wood screws
As needed, 1-in. brads
1 1¾-in. brass hinge hasp. Available from The Woodworkers' Store, 21801 Industrial Boulevard, Rogers, MN 55374. Part #D3042.
8 ¼-in.-dia. brass shelf pins. Available from the Woodworkers' Store. Part #D5736.
As needed, ½-in. brads
2 2-in. brass hangers. Available from The Woodworkers' Store. Part #D3008.

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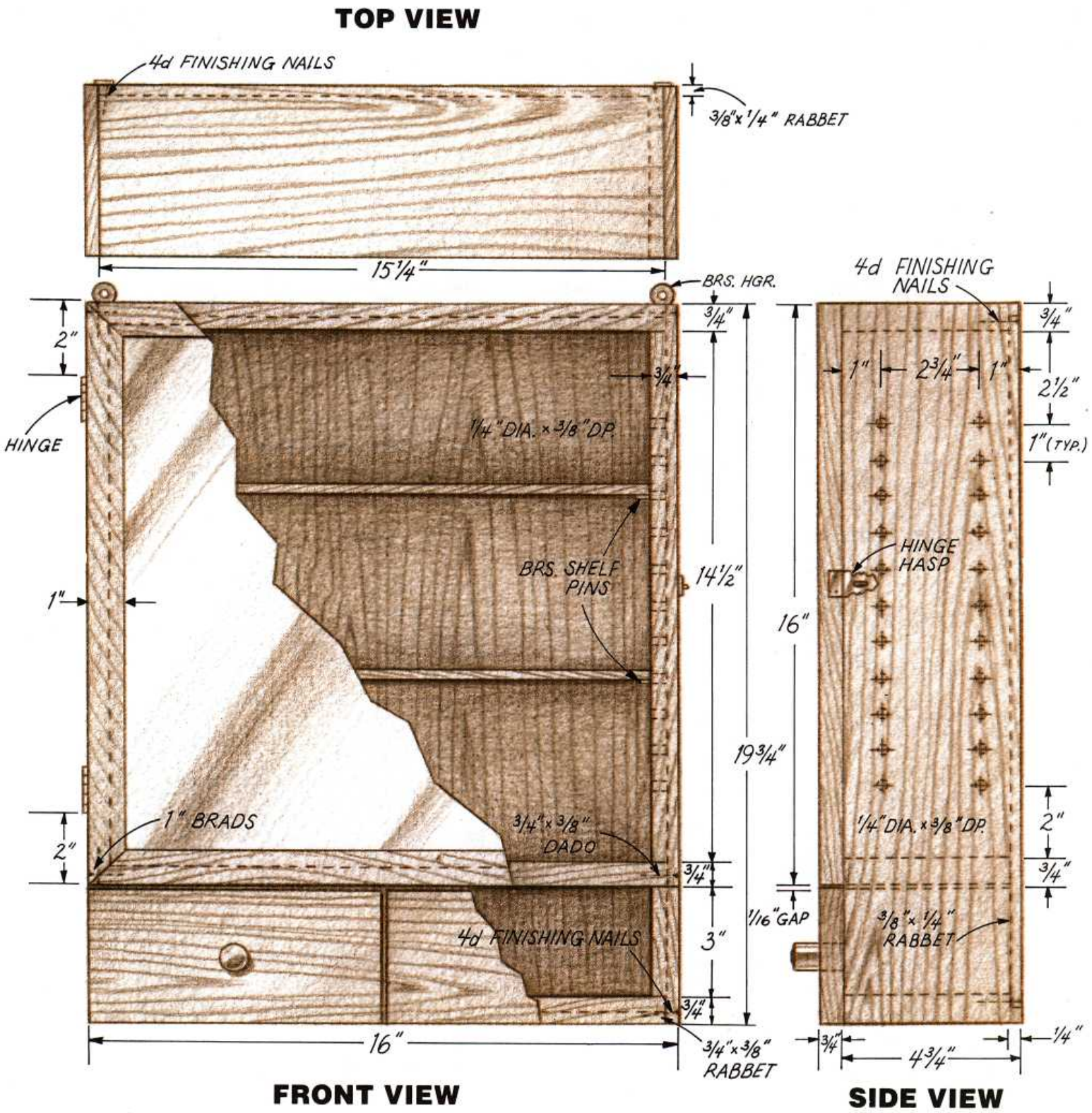

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4 Drill the shelf-pin holes. Set up and drill the shelf-pin holes in the sides as shown in the *Side View.* Note that the holes do not go all the way through the sides.

SHOP TIP: Drill the holes for the adjustable shelf pins with the help of a template. Make the template from some scrap wood cut to the exact dimension of the sides. Lay out and drill the shelf-pin holes, shown in the *Side View, on the template.* Clamp the template to the cabinet side. Drill through the holes in the template to locate the holes in the side.

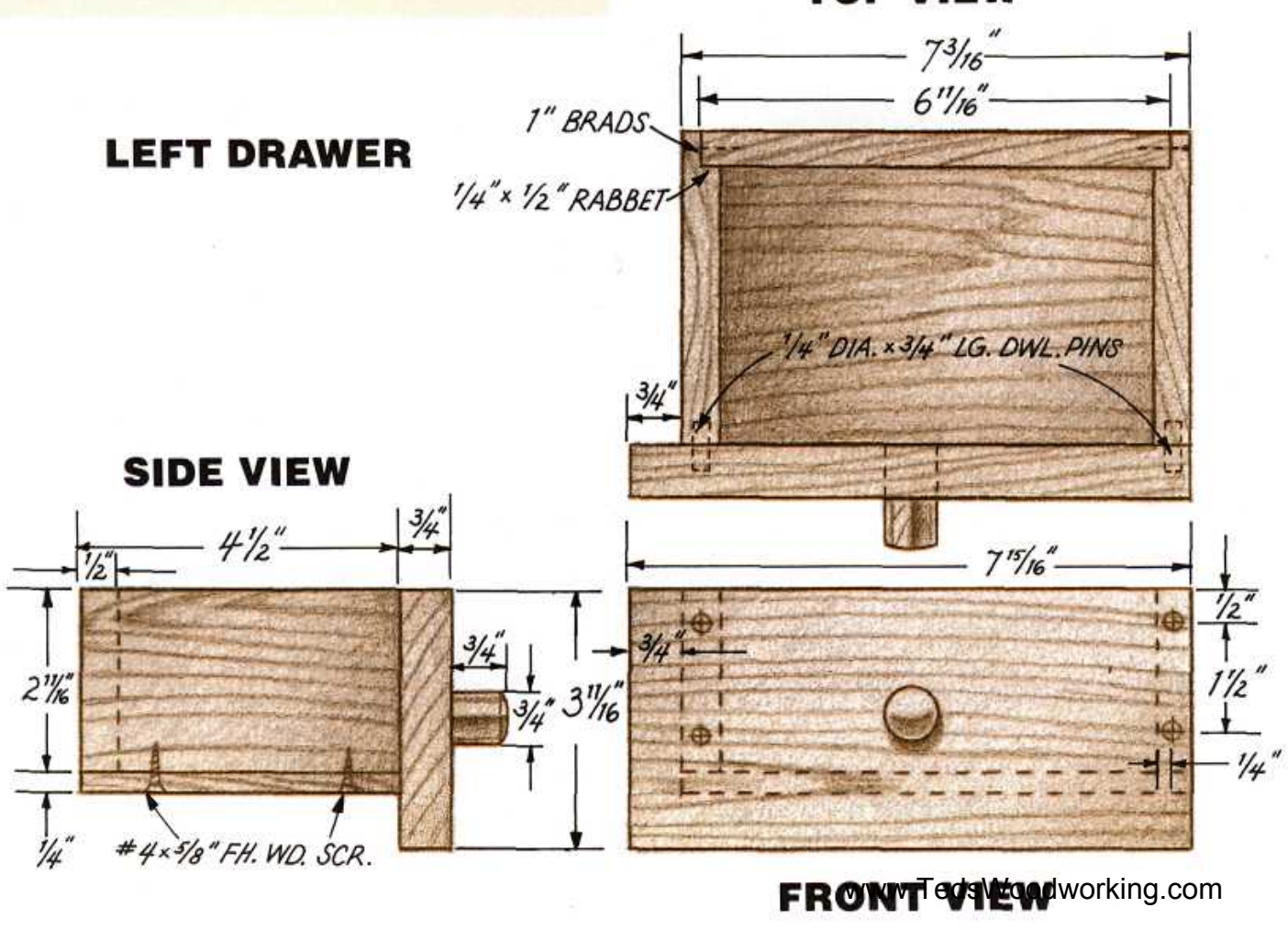
To make an identical set of holes on the second side, mark the front and top edges of the template and make sure the marks line up with the top and front of the second side.

5 Assemble the case. Glue and nail the drawer shelf into the side dadoes and glue and nail the top and bottom into the appropriate rabbets. Make sure that the front edge of the drawer shelf is flush with the front edge of the sides.

Before the glue dries, make sure the cabinet is square. Drop the back in place and secure with 4d finishing nails.

6 Make the drawers. The two drawers are not identical. They are mirror images: The left drawer front overhangs the left side of the drawer cabinet, and the right drawer overhangs the right side.

The drawers are simply built. The sides are attached to the drawer front with dowel pins and rabbeted to accept the back. The drawer bottom is screwed in place below the sides and back.



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To make the drawer, first drill dowel-pin holes in the front edge of the drawer sides as shown in the *Left Drawer, Front View.*

On the table saw, rabbet the sides to accept the back, using a dado blade. When rabbeting, guide the drawer over the blade by using the miter gauge, set at 90 degrees.

Drill the hole for the drawer pull in the center of each drawer front. Insert the drawer pull made from a ¾-inch dowel in the hole and glue in place.

Assemble the drawer. First, attach the sides to the front with dowel pins and glue. Next, glue and nail the back into the rabbets in the sides. Finally, position the bottom, as shown, and screw it to the sides and back.

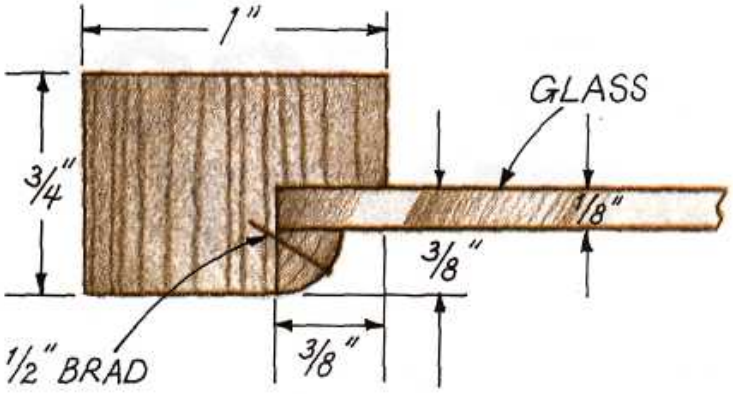
7 Rabbet and miter the door stock to make the door. The door glass sits in a rabbet in the back of the door frame. To cut the rabbet in the door stock, put a ⅜-inch rabbeting bit in the router. Secure the router in a router table and set it to cut a rabbet as shown in the *Door Stock Detail.*

Miter the door stock to make the door. Cut the miters in the stock one piece at a time and check their size against the front edge of the cabinet. Cut all four sides of the door frame.

Apply glue on the mitered ends and then clamp the door together with corner clamps. With the door frame still in the clamps, tack the miters together with 1-inch brads and allow the glue to dry.

The door glass is held in place by a ¼-inch quarter-round molding. Quarter-round molding can be bought from most lumber and hardware stores, or you can make it yourself with a ¼-inch roundover bit and router. Rout the edge of a wide board, then rip the molding from it. To avoid kickback, set up the cut so the molding is on the side of the blade farthest from the fence. Miter the molding to fit the rabbeted back of the door.

DOOR STOCK DETAIL



8 Hang the door. With the hinge as your guide, mark and cut the hinge mortises in the front edge of the cabinet and the back of the door as shown in the *Front View.* You can cut the mortises with a chisel or a router and straight bit. Each mortise should take up an equal amount of the closed thickness of the hinge. Make sure that with the hinge in place the door sits flush against the cabinet.

Mark and predrill holes for the hinge screws, then hang the door.

For more information on mortising, see "Hinge Mortises" on page 7.

9 Apply the finish and install the glass. Finish sand the cabinet and soften the sharp edges. Round the door pulls with sandpaper.

The cabinet shown has a clear finish, but you can finish yours in any way that best fits your decor. You may want to choose a finish that will accent the objects you'll be displaying.

When the finish has dried, have the glass cut to fit the door. Install the glass with the quarter-round molding and ½-inch brads. Position the brass hangers as shown and screw in place.

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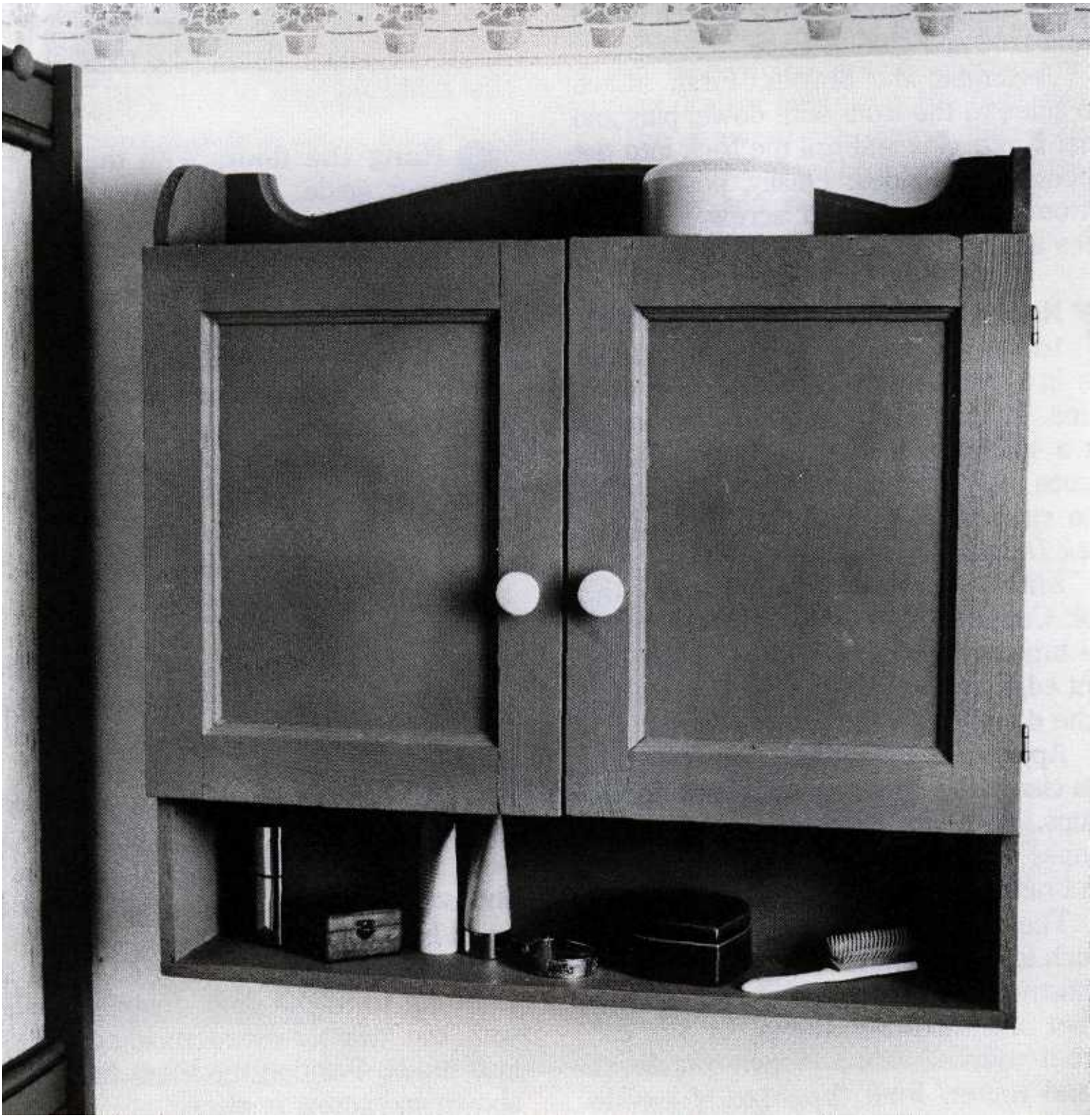
BATHROOM CABINET



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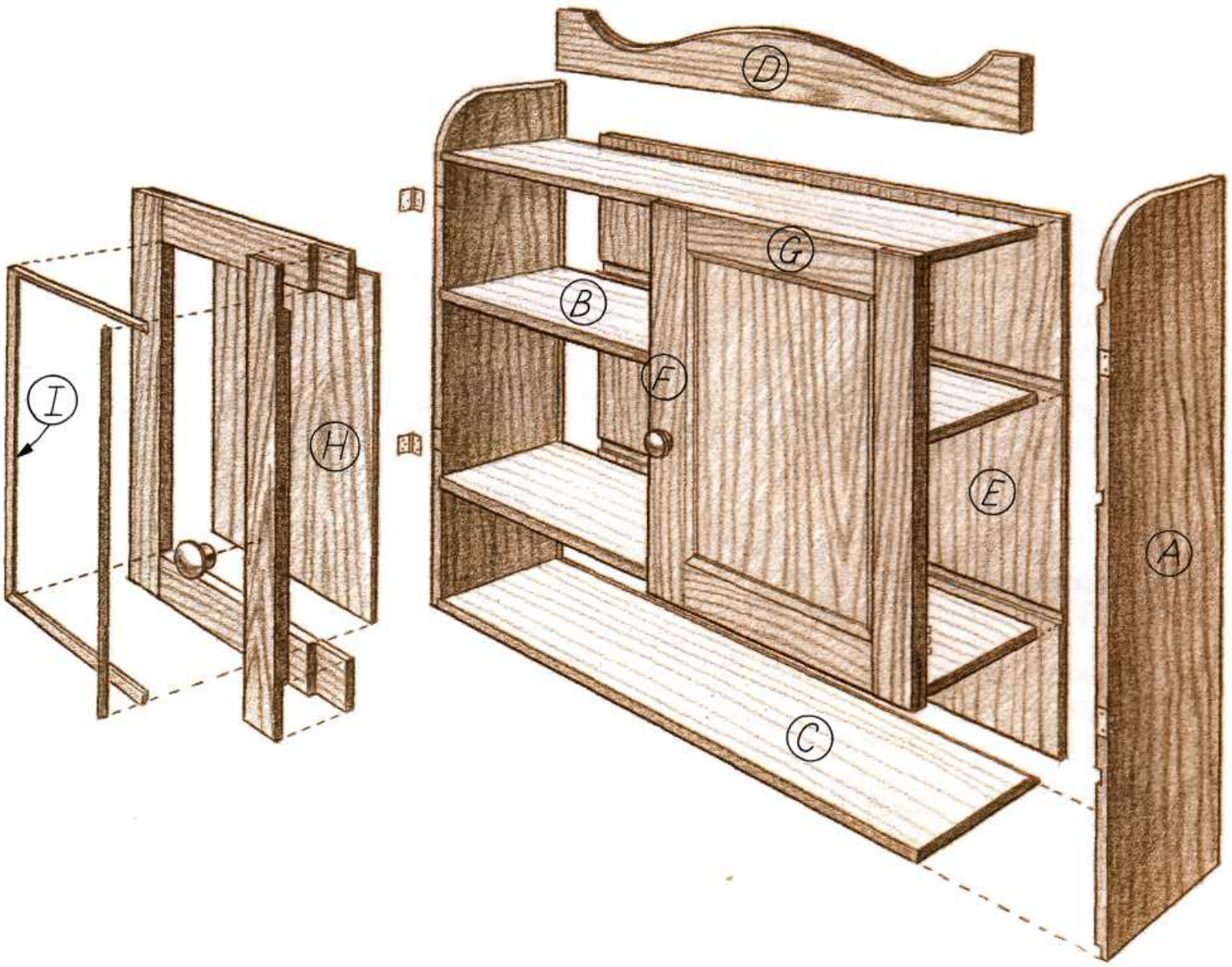

EXPLODED VIEW

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1 Select the stock and cut the carcase parts. Joint, plane, rip, and cut the sides, shelves, and bottom to the sizes given in the Cutting List. Cut a 3-inch radius on the top front of each side on the band saw as shown in the *Side View.* Sand the sawed surfaces smooth. Lay out the sides as shown in the *Side View.*

2 Dado the sides. Cut the dadoes with the dado cutter on your table saw or radial arm saw. On the radial arm saw, align the bottoms of the two sides and dado both in one pass. On the table saw, dado one side at a time. Guide the cuts with the miter gauge, using the fence as a stop. Cut a dado on each side before readjusting the fence. On either saw, rabbet for the bottom using the same dado blade setup. Clamp a wooden auxiliary fence to the table saw fence to protect it from the cutter.

SHOP TIP: Cut sample dadoes in a piece of scrap. Adjust the width of the dado cutter by slipping washers made of paper over the saw arbor between the saw blades.

3 Rabbet for the back and hanging rail. The sides are rabbeted in back for the hanging rail and the back. Because the rail is thicker than the back, the rabbet changes from ¾ inch at top to ¼ inch below.

Cut a ¼-inch rabbet along the entire length of the back first. Then rout a ¾-inch rabbet to house the hanging rail. Make both cuts with the same setup on the router table: Put a ¾-inch straight bit in the router and set it to cut a groove ¼ inch deep. Adjust the fence to adjust the width of cut.

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Sides	2	½″ × 5½″ × 26″	
B. Shelves	3	½″ × 5¼″ × 25½″	
C. Bottom	1	½″ × 5½″ × 25½″	
D. Hanging rail	1	¾″ × 3″ × 25½″	
E. Back	1	¼″ × 23″ × 26″	
F. Door stiles	4	¾″ × 2″ × 17¼″	Cut to fit.
G. Door rails	4	¾″ × 2″ × 13¼″	Cut to fit.
H. Door panels	2	¼″ × 10″ × 14″	Cut to fit.
I. Door trim	1	¼″ × ¼″ × 90″	Miter to fit.

Hardware

4 1 × 1-in. butt hinges
2 1¼-in. porcelain knobs
6 2d finishing nails
12 1-in. brads.
2 small magnetic door catches

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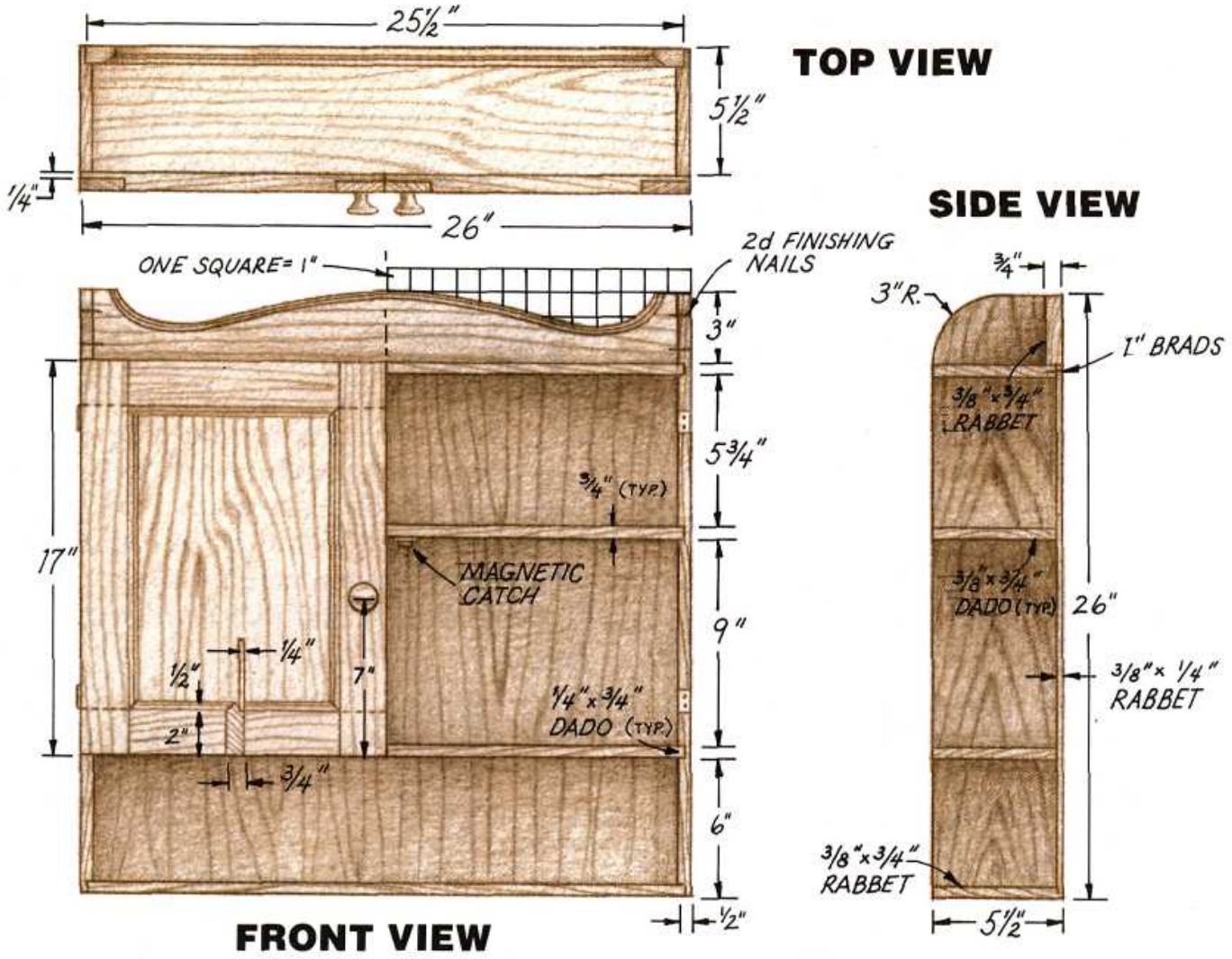
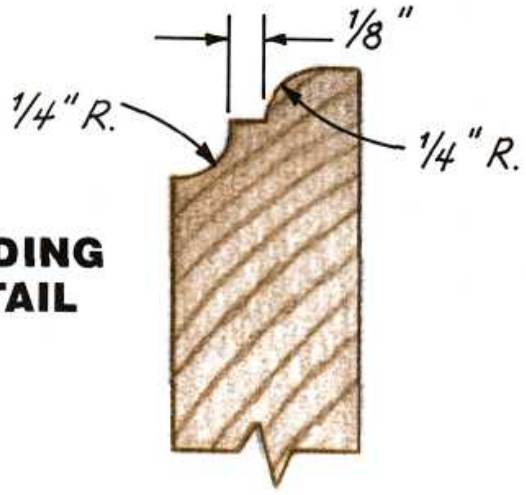


4 Shape the hanging rail. Draw a 1-inch grid on a piece of paper and draw the hanging rail pattern onto it. Transfer the pattern to one end of the rail, flip it over, and transfer it to the other. Cut the curves. Sand out any saw marks. Rout the molding to the profile shown in the *Molding Detail* with a cove and bead bit with a ball bearing pilot.



MOLDING DETAIL

5 Assemble the cabinet. Test fit the cabinet parts and check for square and snug-fitting joints. Make any necessary adjustments.

Put glue in the dadoes and bottom rabbets. Make sure the top of the hanging rail is flush with the sides and clamp the cabinet together. Check to make sure the cabinet is square. When the glue is dry, nail the hanging rail to the sides with 2d finishing nails.

6 Install the back. Measure the opening for the back and cut the back to fit. Apply glue to the back rabbet. Put the back in position and nail it in place with 1-inch brads on each side.

7 Make the door stiles and rails. Cut the rails and stiles to fit the cabinet. Each rail is half as long as the cabinet

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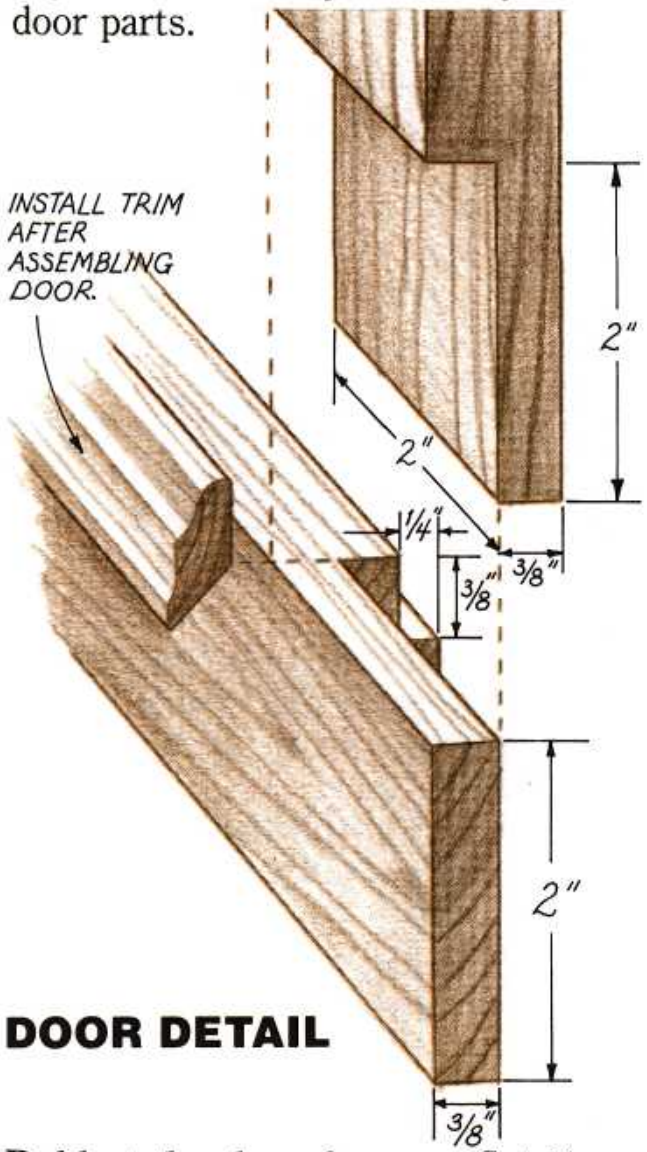
is wide. The stiles must be long enough to cover the bottom and top shelves as shown in the *Front View.* Set the dado blade on the table saw or radial arm saw to cut a half-lap joint on each piece as shown in the *Door Detail.* Test the depth and width of the cut on a piece of scrap and adjust as necessary. Cut the joints on the door parts.

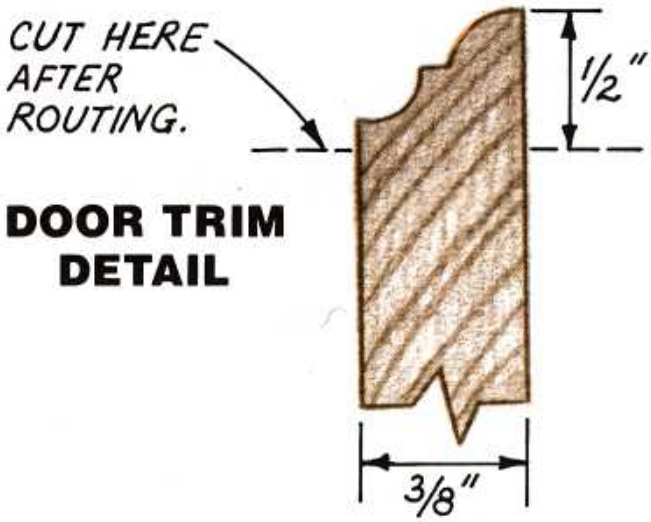


DOOR DETAIL

8 Rabbet the door frames. Cut ¼ × ⅜-inch rabbets for the plywood panels as shown in the *Door Detail.* To cut the rabbets, put a straight bit in the router. Secure the router in a router table and adjust the fence to get the appropriate size cut.

9 Assemble the door frames. Glue and clamp the doors together. Make sure the doors are square before the glue sets. Cut the panels to fit snugly in the frames. Glue and clamp them into place.

10 Install the door trim. Rout a piece of scrap to the profile shown in the *Door Trim Detail.* Rip the molded edge from the scrap on the table saw to produce the door trim. When you rip the scrap, adjust the fence so that the trim is to the left of the saw blade rather than between the fence and the blade. Miter the trim to fit inside the door frame and glue it to the front of the door.



DOOR TRIM DETAIL

11 Hang the doors and install the knobs. Mortise each door for the butt hinges and hang the door, as explained in "Hinge Mortises" on page 7. Drill holes for the knobs and screw them in place.

12 Apply finish. Finish sand the entire piece. Apply stain, if you wish. For a finish that will resist moisture, apply spar varnish. When the finish is dry, attach the magnetic door catches below the middle shelf.

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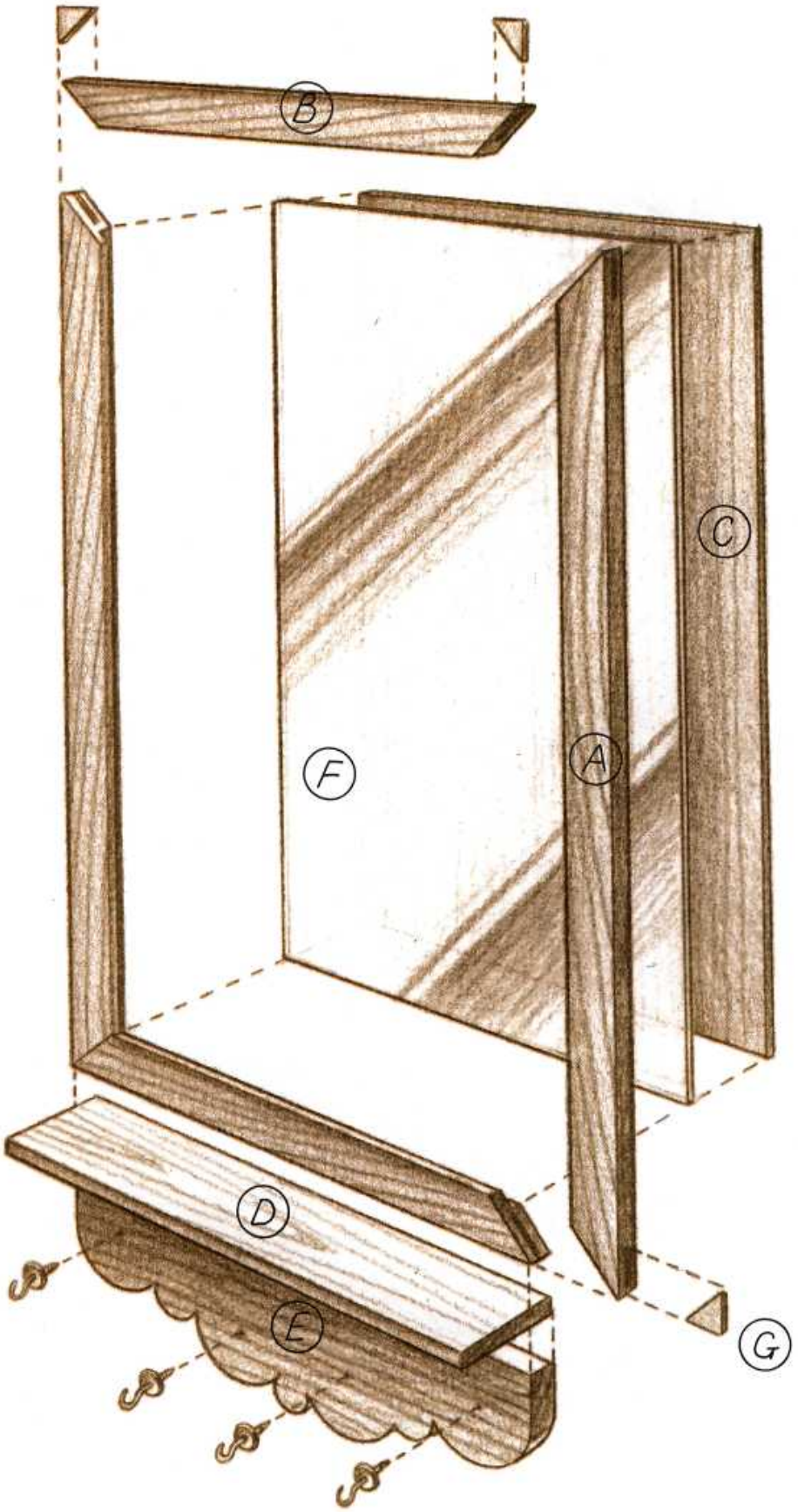
HALL MIRROR



EXPLODED VIEW

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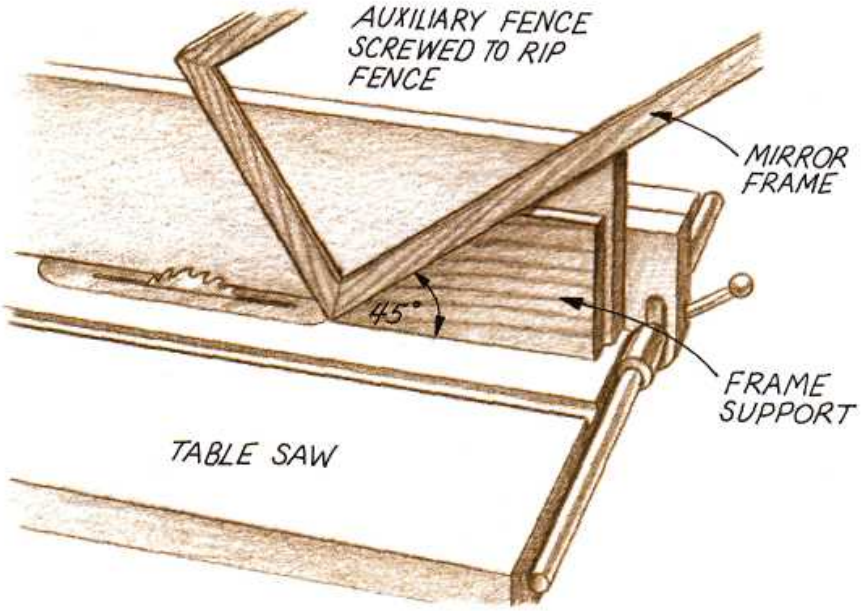
1 Select the stock and cut the parts. The mirror shown is made from pine. You can build your hall mirror from any wood you may have on hand. Choose straight, flat stock. Joint, plane, rip, and cut the parts to the sizes given in the Cutting List.

2 Cut a rabbet in the frame stock. The mirror glass sets in a ⅜ × ⅜-inch rabbet in the back of the frame. Put a ⅜-inch straight bit or a ⅜-inch rabbeting bit in your router. Secue the router in a router table and cut the rabbet.

3 Miter the frame. Cut the frame miters on your table saw. Guide the frame stock as you miter with your miter gauge set at 45 degrees. Cut the sides, top, and bottom to length as you cut the miters on each end.

4 Assemble the frame. On a flat surface, glue and clamp the mirror frame together and make sure that the frame is square. The frame is square if the diagonal corner-to-corner measurements are equal. To strengthen the miters, predrill and brad the miters together as shown in the *Front View.*

SPLINED MITER DETAIL



SHOP TIP: For extra-strong miter joints, glue splines in the corners instead of using nails. Cut the spline joints on the table saw after the frame has been glued and is completely dry.

First, lay out a spline on one corner of the frame as shown in the *Front View* and *Side View.* With the table saw miter gauge, cut a 45-degree angle on the end of a ¾ × 8 × 12-inch scrap of plywood. This is your frame support. Screw or clamp an auxiliary 12 × 24-inch plywood fence on the table saw fence. Raise the saw blade the depth of the spline cut. Put the frame support block against the auxiliary fence and put the mirror frame against the support block as shown in the *Splined Miter Detail.* Adjust the saw fence until the spline layout aligns with the blade and lock the fence. Hold the frame firmly and push the frame and frame support piece completely through the blade to cut the spline slot. Turn the frame and cut the spline slot on each corner.

Next, rip a spline from some scrap wood to the thickness of the spline slot. The spline should slip snugly into the slot cut for it. Glue each spline in its slot and squeeze the frame against the spline with a C-clamp. When the glue has dried, trim the spline flush with the mirror frame with a sharp chisel or hand plane.

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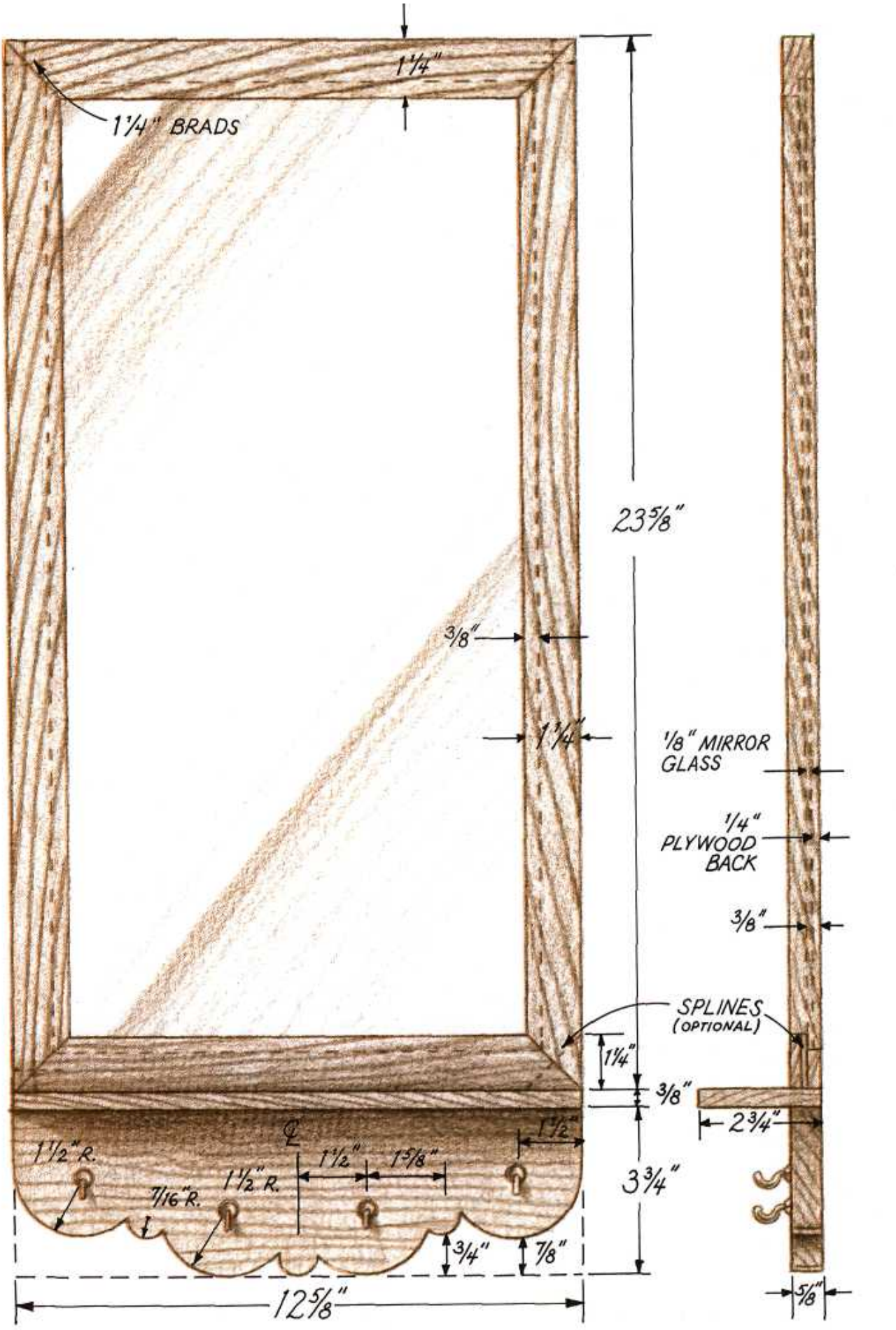

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5 Attach the shelf to the frame. Glue and clamp the shelf to the bottom of the frame. Clean up any excess glue.

6 Cut the hanging board to shape. With a compass, lay out the pattern on the bottom of the hanging board as shown in the *Front View.* Cut out the shape on the band saw. Clean up the sawed edge with files and sandpaper.

7 Drill holes for the hanging hooks. Lay out the hooks and drill holes for them that are slightly smaller than their threaded shank.

8 Attach the hanging board. Glue and clamp the hanging board to the bottom of the mirror shelf. Sand the mirror frame, frame back, shelf, and hanging board.

9 Apply the finish and add the mirror glass and hooks. After sanding, stain and varnish or paint the assembly to complement your decor. When the finish is dry, install the mirror glass. Cut your own mirror glass, or have a local glass shop cut it to size for you. Glue or nail the plywood backing in place. Screw four brass cup hooks into the predrilled holes.

10 Hang your hall mirror. Your local hardware store will have several options for hanging hardware. One of the simplest ways to hang the mirror is to screw two #8 × ¾-inch roundhead wood screws into the back of the frame, and stretch a stout wire between them. Then hang the mirror as you would a picture.

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Sides	2	⅝″ × 1¼″ × 23⅝″	Cut top, bottom, and sides from one 80″ piece.
B. Top/bottom	2	⅝″ × 1¼″ × 12⅝″	
C. Mirror back	1	¼″ × 10⅞″ × 21⅞″	Plywood
D. Shelf	1	⅜″ × 2¾″ × 12⅝″	
E. Hanging board	1	⅝″ × 3¾″ × 12⅝″	
F. Mirror glass	1	⅛″ × 10¾″ × 21¾″	
G. Splines	4	⅛″ × 1¼″ × 1¼″	Optional

Hardware

4 ⅞-in.-long brass cup hooks
8 1¼-in. brads

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DOVETAIL MIRROR

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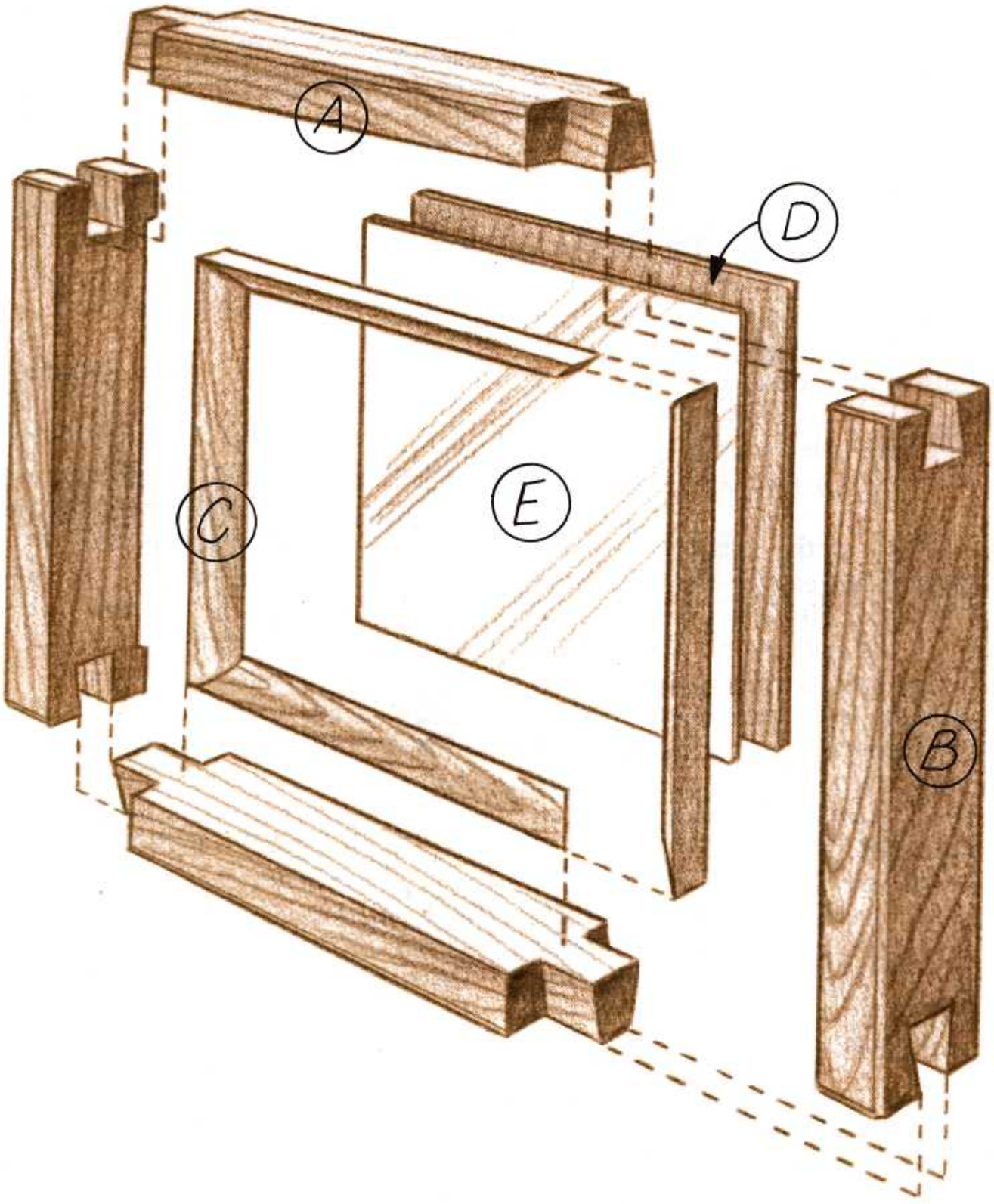

EXPLODED VIEW

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1 Select the stock and cut the parts. Make your frame from any knot-free hardwood or softwood stock. Quarter-round molding is available from most lumber suppliers, but another ¾-inch molding could be substituted. Joint, plane, rip, and cut the parts to the sizes given in the Cutting List.

2 Cut the dovetail joints. Dovetail joints are made up of pins and tails. In the case of this frame, there is a single pin on each end of the rails. The pin slides between two tails on the stiles. If you are inexperienced at cutting dovetails, cut some practice dovetails before cutting them in the mirror frame.

First, set a marking gauge to the thickness of the rails and stiles and scribe a line around each end of the rails and stiles.

Next, lay out the pins, as shown in the *Side View,* on each end of the rails. Set a T-bevel to 80 degrees and lay out the pins on the end grain. Transfer the lines to the faces of the board with a square. Clearly mark the waste and cut it away with a dovetail saw or band saw.

When the pins have been cut, lay out the tails directly from the pins. Put the rails and stiles together as if to form a corner of the mirror. Trace around the pins to lay out one face of the tails. To lay out the second face, first transfer the lines across the end grain with a square and a sharp knife. Transfer the lines onto the second face with a sliding T-bevel set to the angles on the first face.

Put the stiles in a vise and cut down along the layout lines to the scribe lines with a dovetail saw. Stay to the outside of the layout lines. Chisel out the waste. Test fit the joints and pare the pins to fit, if necessary.

For more on cutting dovetails, see "Dovetailing" on page 42.

3 Glue the frame together. Glue and clamp the dovetail joints of the frame together on a flat surface. Measure across the corners to make sure the frame is square. Clean up any excess glue and allow the joints to dry.

4 Cut the rabbet. The mirror back fits within a rabbet routed in the back

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Frame rails	2	1⅜" × 2¾" × 11¾"	
B. Frame stiles	2	1⅜" × 2¾" × 11¾"	
C. Quarter-round stock	1	¾" × ¾" × 40"	Miter to fit.
D. Mirror back	1	¼" × 9¾" × 9¾"	Plywood
E. Mirror glass	1	⅛" × 8⅞" × 8⅞"	
Hardware			
8 #4 × ⅝-in. screws			
1 mirror hanger			

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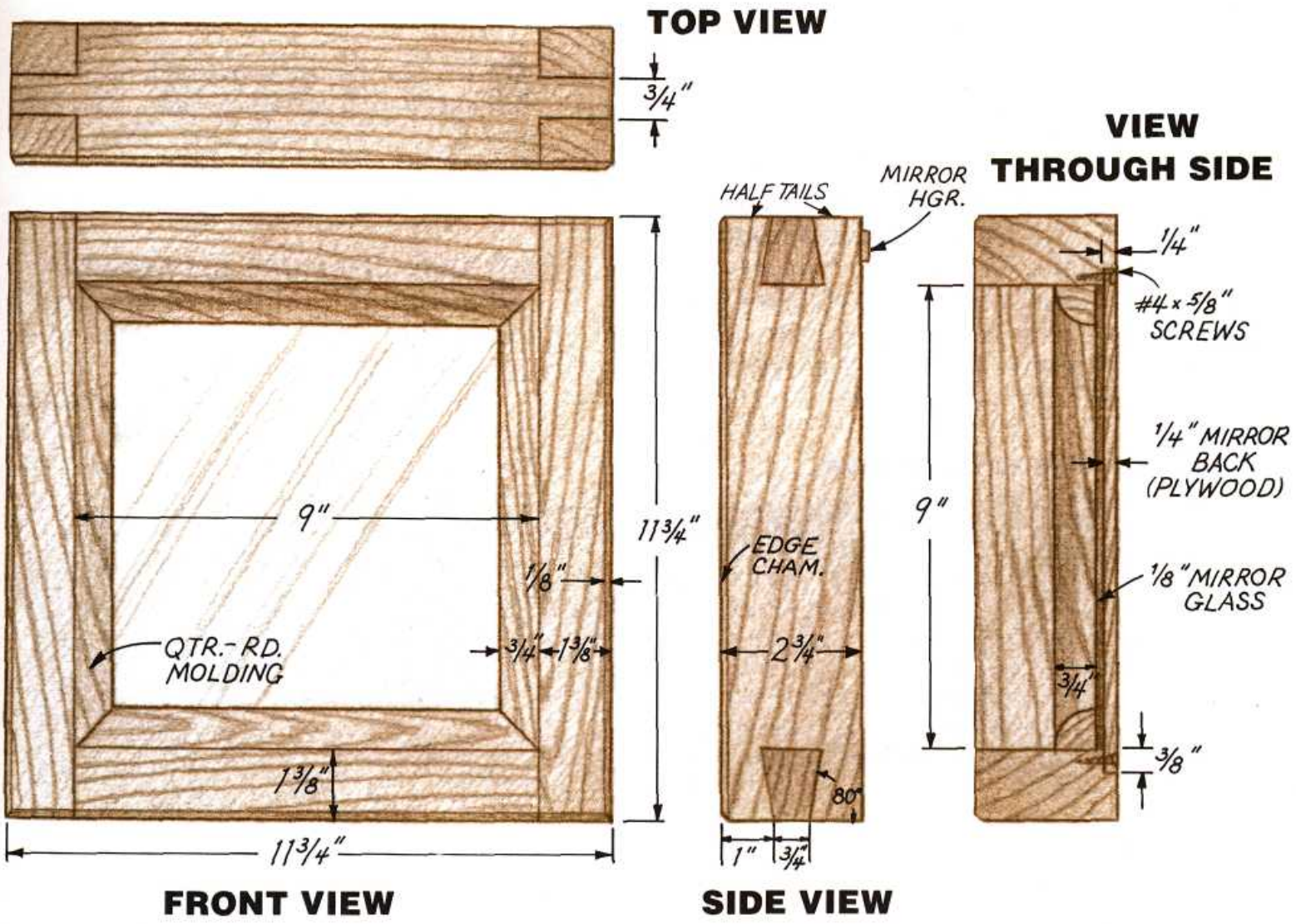

inside edge of the frame as shown in the *View through Side*. Put a ⅜-inch rabbeting bit with a ball bearing guide in your router. Secure the router in a router table and adjust it to cut a ¼-inch-deep rabbet. Lay the frame flat on the router table over the bit and cut the rabbet by guiding the inside edge of the frame against the bit's bearing. Use a push stick and keep your hands well away from the cutter. Square the corners with a chisel.

5 Chamfer the outside edges. Put a chamfering bit in the router. Secure router in the router table and cut a ⅛-inch-wide chamfer on the outside edges of the mirror frame.

6 Miter the quarter-round stock. If you're not using ready-made quarter-round stock, you can make your own with a router and a router table. Guide the cut along a fence and shape the edge of a wide piece of stock with a ¾-inch-radius roundover bit. On the table saw, rip off the roundover stock. Set up the fence so the roundover edge is to the left of the blade rather than between the blade and the fence.

Once you have the stock, cut some test miters. Set your table saw blade to 45 degrees and cut the miters in some scrap. Put the test miters together and make sure that the resulting angle equals 90 degrees. Adjust the blade angle as nec-

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essary and miter the quarter-round stock to fit inside the mirror frame as shown in the *Front View.*

7 Glue the quarter-round stock to the frame. Adjust a marking gauge to scribe a line ⅛ inch from the rabbet on the inside of the frame. Scribe the line and glue and clamp the quarter-round stock just above the line. Clean up any excess glue with a damp cloth.

SHOP TIP: If you need to glue a small molding to an awkward spot, try clamping it with spring clamps. Spring clamps—which look something like large clothes pins—are available at most hardware stores and are an excellent help in an awkward situation. Open the clamp with one hand and set it in place. A plastic coating on the clamp helps protect the wood.

8 Fit the back. Depending on the accuracy of your dovetails, the back may need some adjustment. Test fit the back and trim it, if necessary, on the table saw.

9 Apply the finish and install the mirror glass. Finish sand the mirror frame. Stain and varnish or paint it to match your decor.

When the finish is dry, put the mirror glass in place in the back of the mirror frame. Set the back in its rabbet and screw it in place with #4 × ⅝-inch screws.

Attach a mirror hanger, which is available at most hardware stores, to the back of the mirror frame and hang your dovetail mirror.

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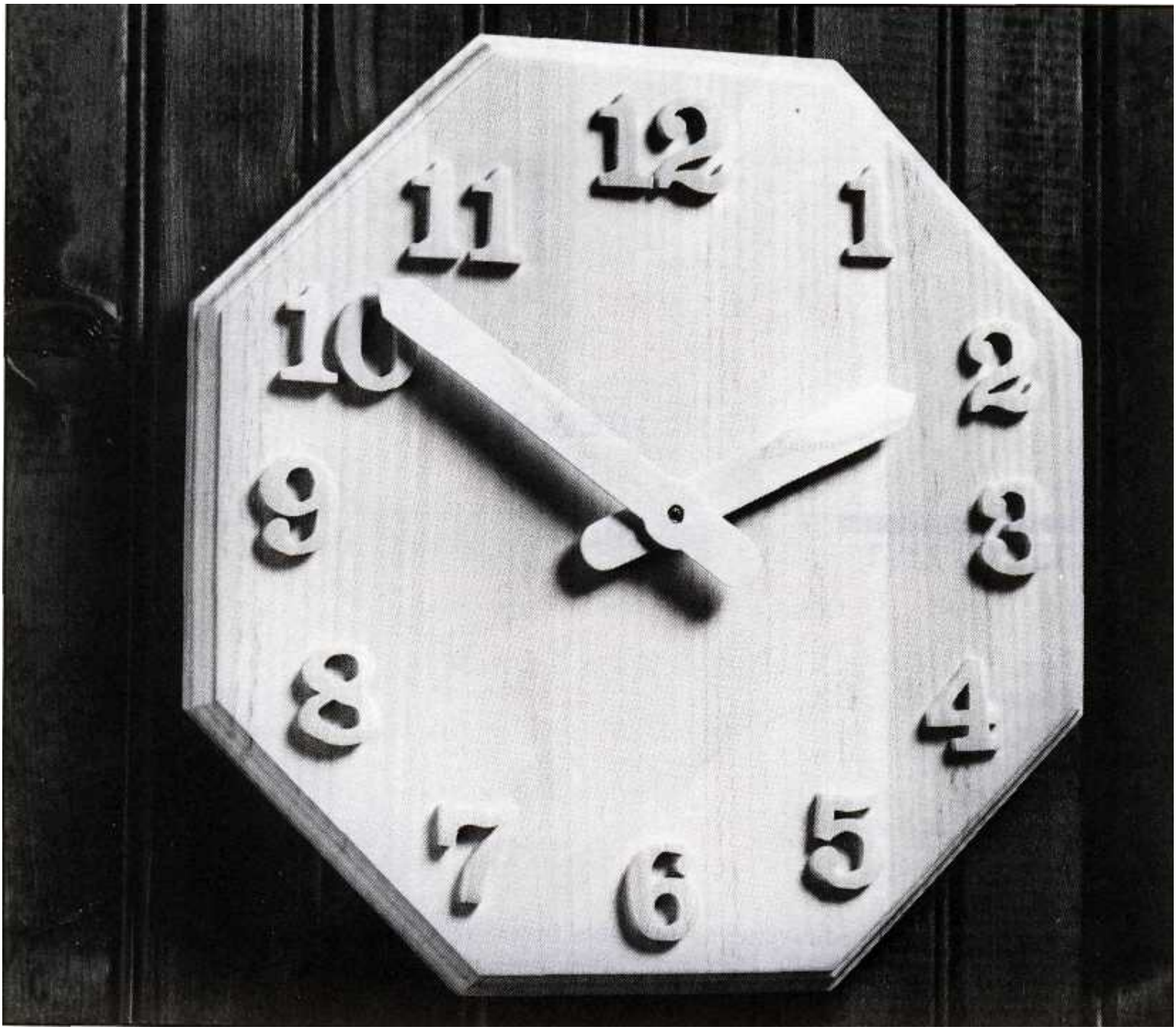
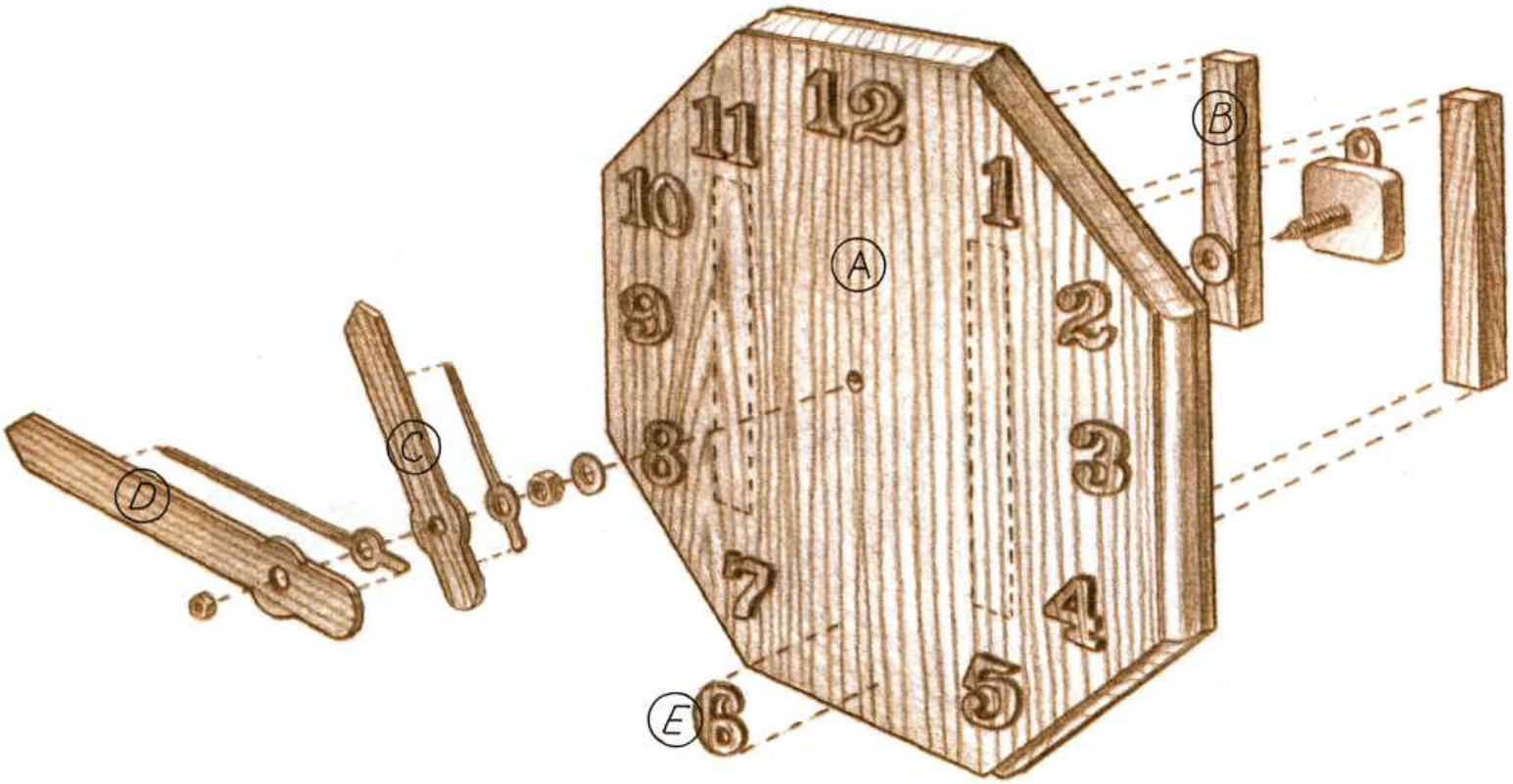
WALL CLOCK





EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension
A. Face	1	¾" × 14" × 14"
B. Spacers	2	¾" × 11/16" × 7"
C. Hour hand	1	3/32" × ¾" × 5¾"
D. Minute hand	1	3/32" × ¾" × 7"
E. Numerals	15	⅛" × 1¼" × 1¼"

Hardware

6 1¼-in. brads
1 5/8 × 2⅛ × 2⅛-in. movement. Available from Precision Movements, 2024 Chestnut Street, Emmaus, PA 18049. Part #QC24US, extralong shaft.

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1 Select the stock and cut the parts. Choose straight, flat stock for the face. Joint, plane, rip, and cut the parts to the sizes given in the Cutting List. If necessary, glue up stock to get a board wide enough for the face.

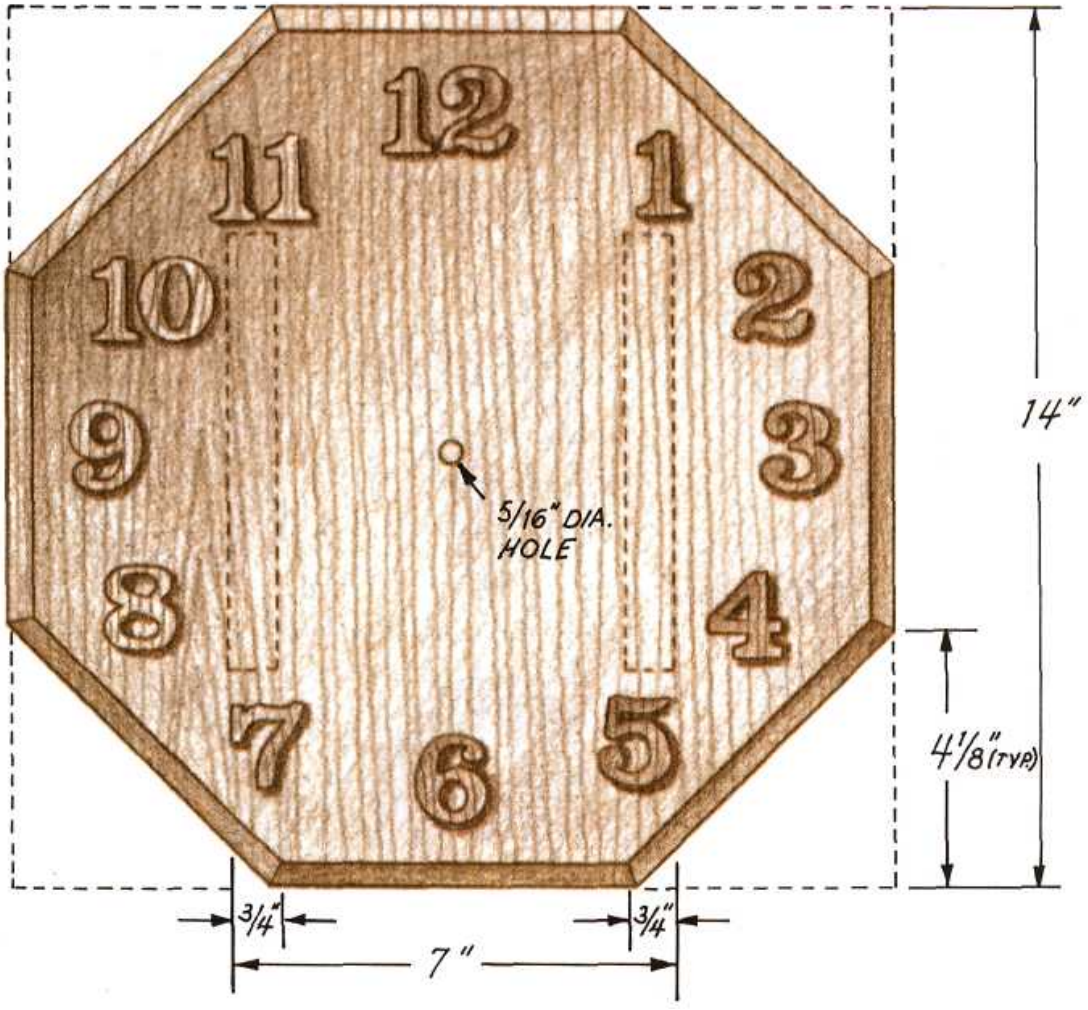
2 Cut the corners off the face to form an octagon. Mark and cut off the corners of the face on your band saw as shown in the *Front View.* Even up the cuts with a block plane or belt sander.

3 Rout the profile on the edge of the face. Put a 5/32-inch-radius Roman ogee bit in your router. Secure the router in a router table and adjust the fence and router height to cut the profile shown in the *Side View.*

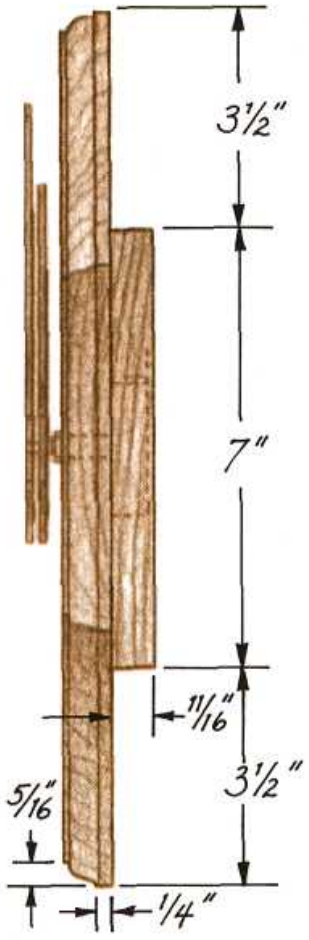
4 Attach the spacers to the back. Glue the spacers to the back of the face as shown. Nail them in place with 1¼-inch brads.

5 Drill the movement shaft hole. Lay out and drill a 5/16-inch-diameter hole for the clock shaft in the center of the face. This hole must be drilled at exactly 90 degrees to the surface for the movement to seat correctly.

FRONT VIEW



SIDE VIEW



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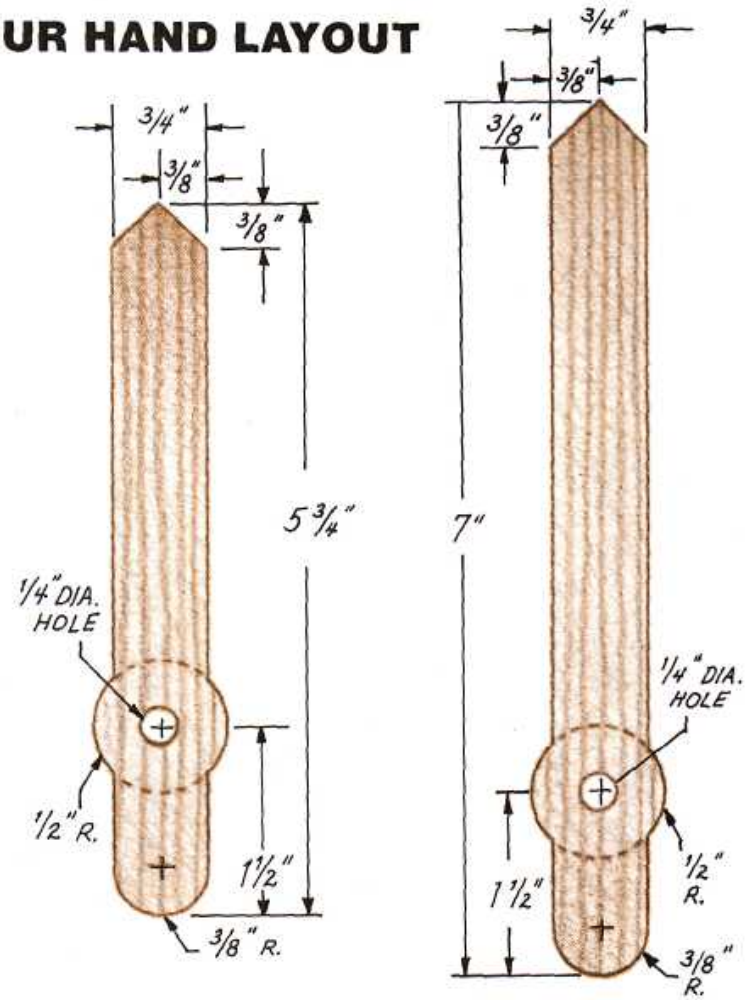
6 Cut the hands to shape and fasten them to the metal hands. Cut the hour and minute hands on the band saw to the dimensions shown. Sand the sawed edges and drill a ¼-inch-diameter hole in each, as shown. Epoxy the metal hands included with the movement to the back of the wooden hands. Make sure that the shaft holes on the metal hands align with the holes in the wooden hands.

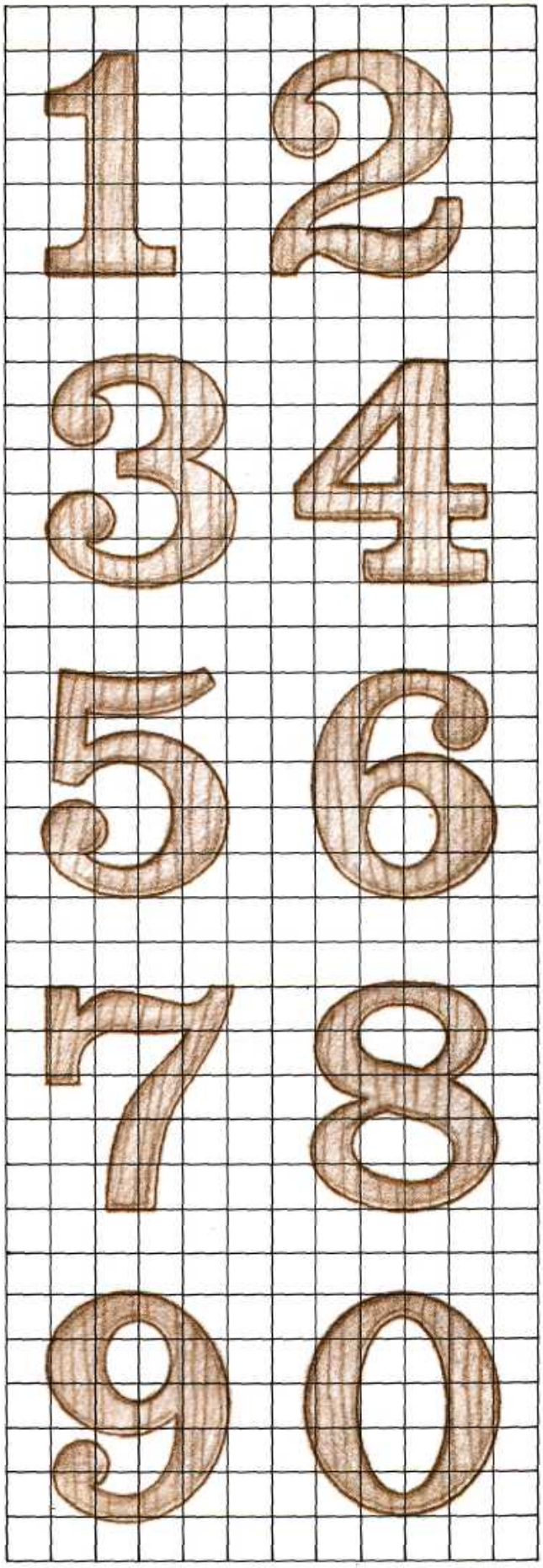
HOUR HAND LAYOUT



MINUTE HAND LAYOUT

7 Cut the numeral shapes and glue them to the face. Draw a ¼-inch grid on a piece of paper and draw the numeral patterns onto it. Transfer the patterns to the wood. Note that you will need five "ones" and two "twos" for a complete set. Cut the numerals on a scroll saw, or by hand with a coping saw.

ONE SQUARE = 1/4" (ACT. SIZE)



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NUMERAL LAYOUT

Sand the sawed edges smooth and glue the numerals in place as shown in the *Front View.*

8 Apply the finish. Finish sand the clock. Because a completely wooden face makes this clock unique, give your clock a clear finish. An oil or a clear lacquer finish would work well.

9 Install the movement. Put the rubber washer over the movement shaft and insert the movement shaft through the shaft hole in the face. The shaft should protrude through the clock face. Put the brass washer over the shaft and lock it in place with the hex nut.

Slip the hour hand onto its shaft. The hour hand is held in place by friction.

Put the minute hand in place on its shaft and lock it in place with the nut provided. Because this nut drops below the surface of the wooden minute hand, you may have to do final tightening with tweezers or needle-nose pliers.

Install the battery, adjust the hands, and hang your clock on the wall.

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BRACKET SHELF

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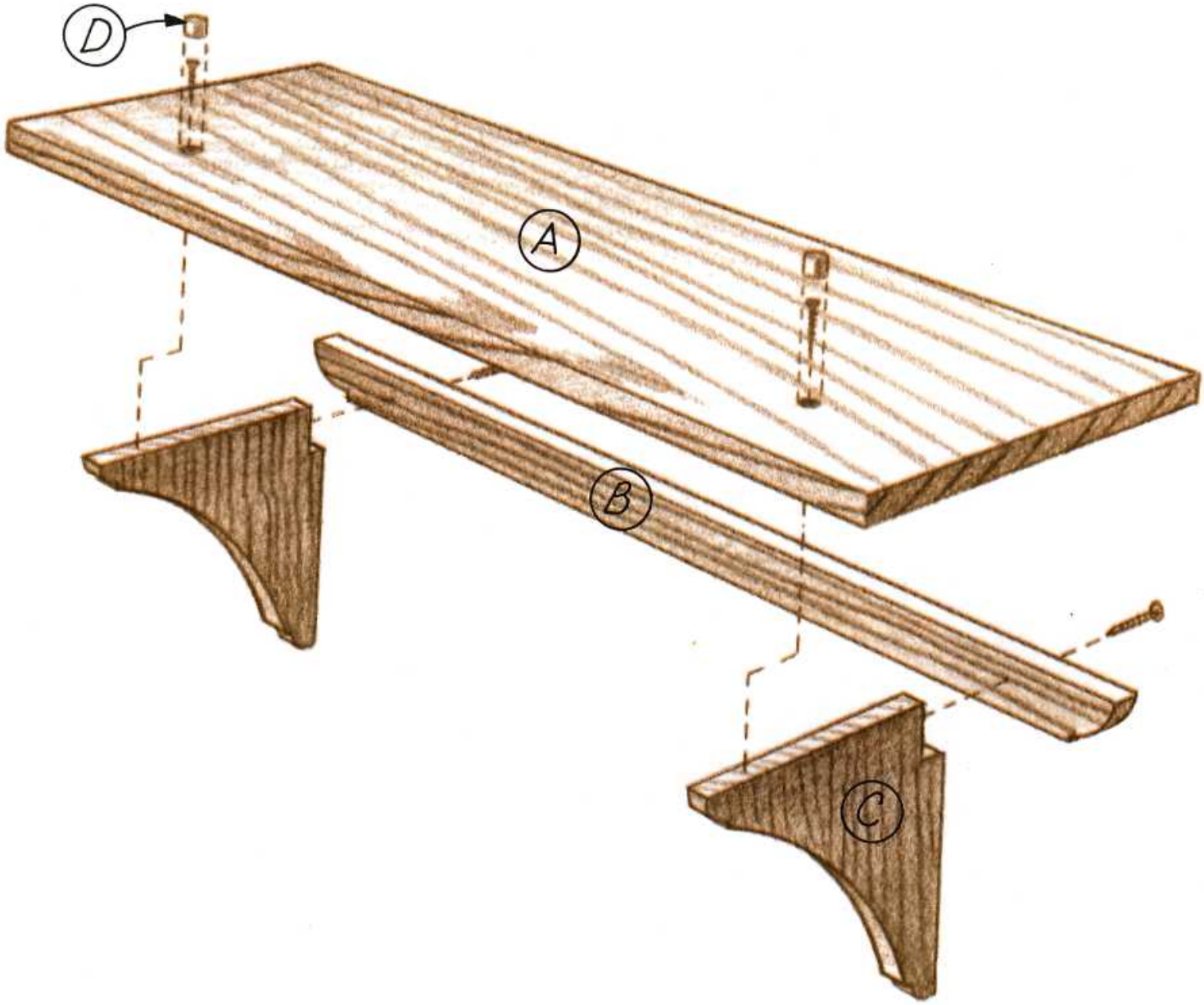

CUTTING LIST

Part	Quantity	Dimension
A. Shelf	1	¾″ × 9¼″ × 24″
B. Cleat	1	¾″ × 1½″ × 21½″
C. Brackets	2	1⅛″ × 8″ × 8″
D. Plugs	6	⅜″ dia.

Hardware

2 #6 × 1½-in. flathead screws
2 #6 × 1-in. flathead screws
2 #8 × 2-in. flathead screws

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1 Select the stock and cut the parts. Choose straight, flat stock. Joint, plane, rip, and cut the parts to the sizes given in the Cutting List. If you plan to make a longer-than-specified shelf, add an additional bracket for every 24 inches of additional length.

2 Notch the brackets. Cut a notch for the cleat in the corner of each bracket, as shown in the *Side View,* with a backsaw or dovetail saw.

3 Cut the shape in the cleat ends and brackets. Draw a ½-inch grid on a piece of paper and draw the cleat end and bracket patterns on to it. Transfer the patterns to the stock and cut the parts to shape with a band saw or jigsaw. Sand off the kerf marks left by the saw.

SHOP TIP: Because the brackets should have identical profiles, cut both at once. First stack the pieces together and secure by putting double-sided tape between them. Then cut both brackets in one operation.

4 Glue the cleat to the bottom of the shelf. Glue the top edge of the cleat to the bottom of the shelf. Secure with clamps and allow the glue to dry.

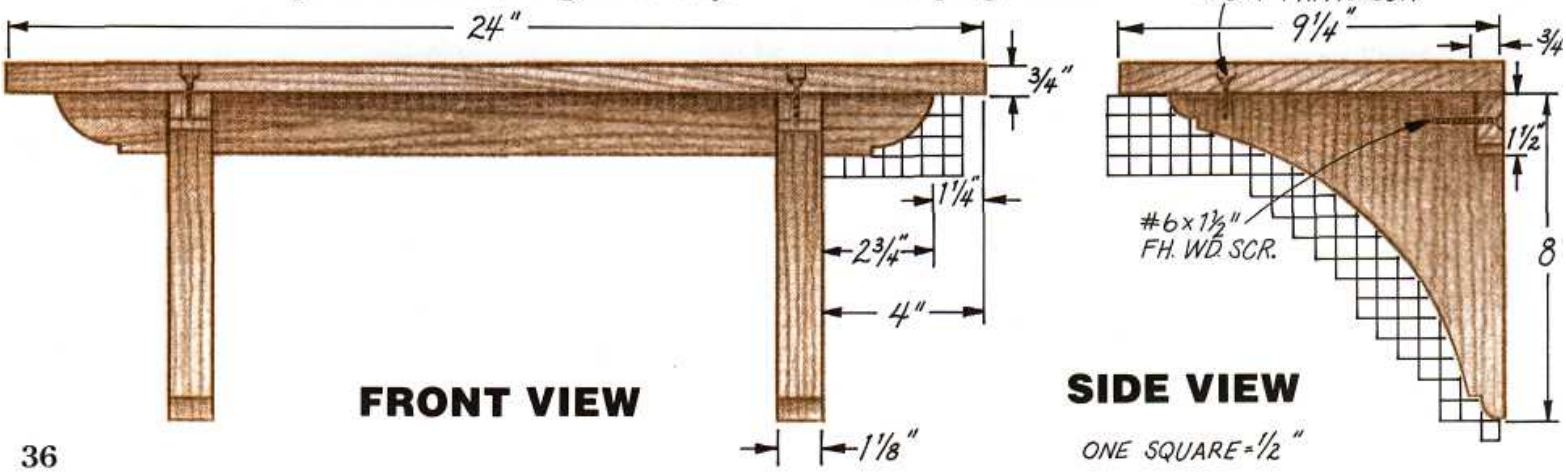
5 Attach the brackets to the cleats and shelf. Glue and screw the brackets to the cleat. Screw, but do not glue, the brackets to the shelf.

SHOP TIP: Test fit the shelf and drill the screw holes with a combination pilot hole bit. These bits drill a hole for the plug, a clearance hole for the screw shank, and a slightly smaller pilot hole for the screw threads all in one operation. Pilot hole bits are available at most hardware stores and are sold according to the screw size.

6 Sand and finish the bracket shelf. Plug the screw holes. Sand the shelf and remove excess glue. Sand the plugs flush. You can round the edges of the brackets and shelf with sandpaper to give the shelf an aged appearance.

Apply a finish that will complement your decor.

7 Hang your bracket shelf. Drill clearance and plug holes in the cleat so that you can drive screws through it and into the studs in your wall. (Normally studs are on 16- or 24-inch centers.) Screw the shelf in place. To cover the screws, tap some prefinished plugs into the plug holes.



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BOOK-SHELF

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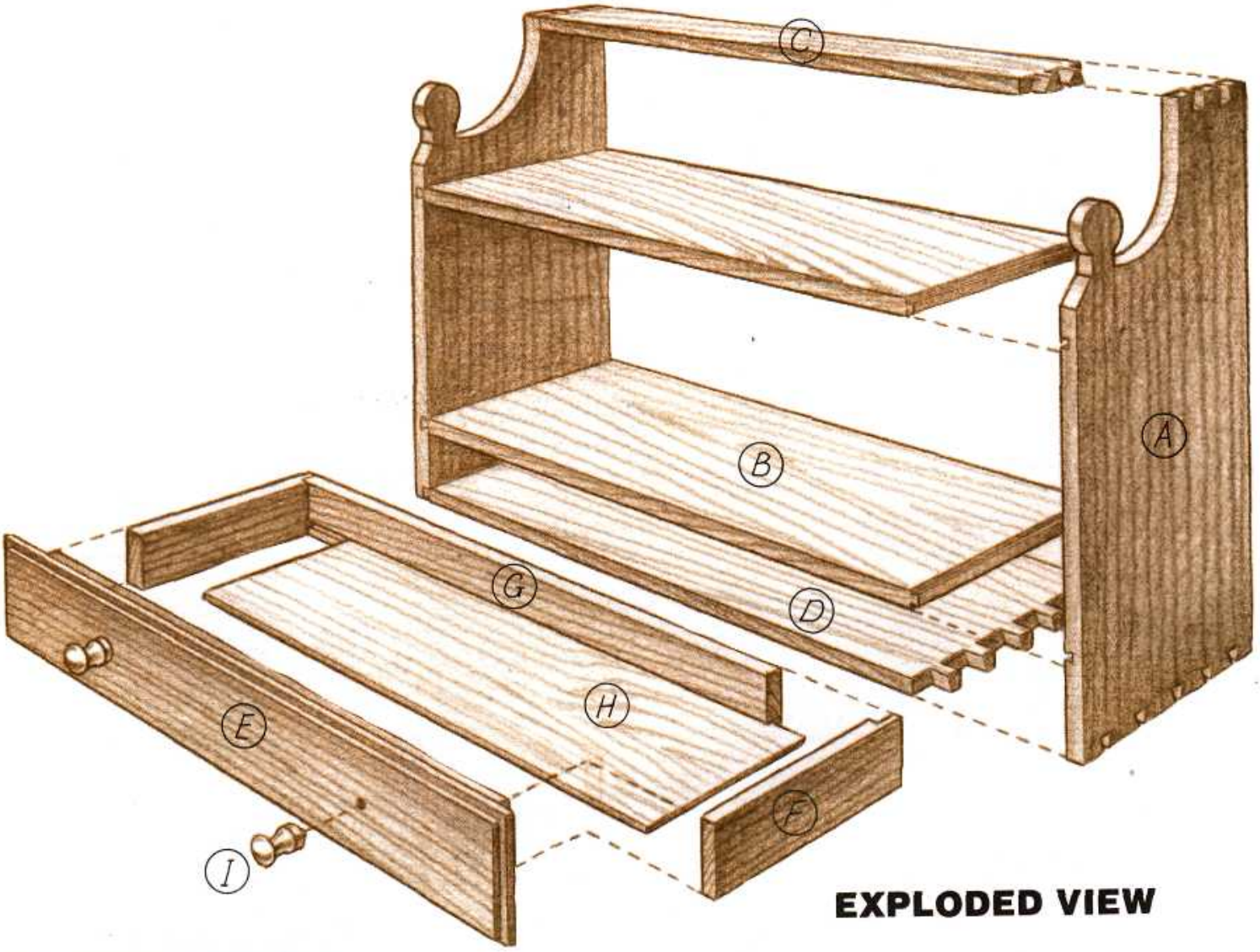

EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Sides	2	¾″ × 9½″ × 25″	
B. Shelves	2	⅞″ × 9½″ × 26″	
C. Top	1	⅞″ × 3¼″ × 26¾″	
D. Bottom	1	⅞″ × 9½″ × 26¾″	
E. Drawer front	1	1″ × 4½″ × 26¾″	
F. Drawer sides	2	⅝″ × 2 11/16″ × 9″	
G. Drawer back	1	⅝″ × 2 11/16″ × 24⅝″	
H. Drawer bottom	1	¼″ × 8⅜″ × 24⅜″	Plywood
I. Drawer pulls	2	2¾″ × 13/16″ × 13/16″	Cut to length after turning.

Hardware

As needed, 4d coated nails
2 ½ × 2-in. hangers. Available from The Woodworkers' Store, 21801 Industrial Boulevard, Rogers, MN 55374. Part #D3008.

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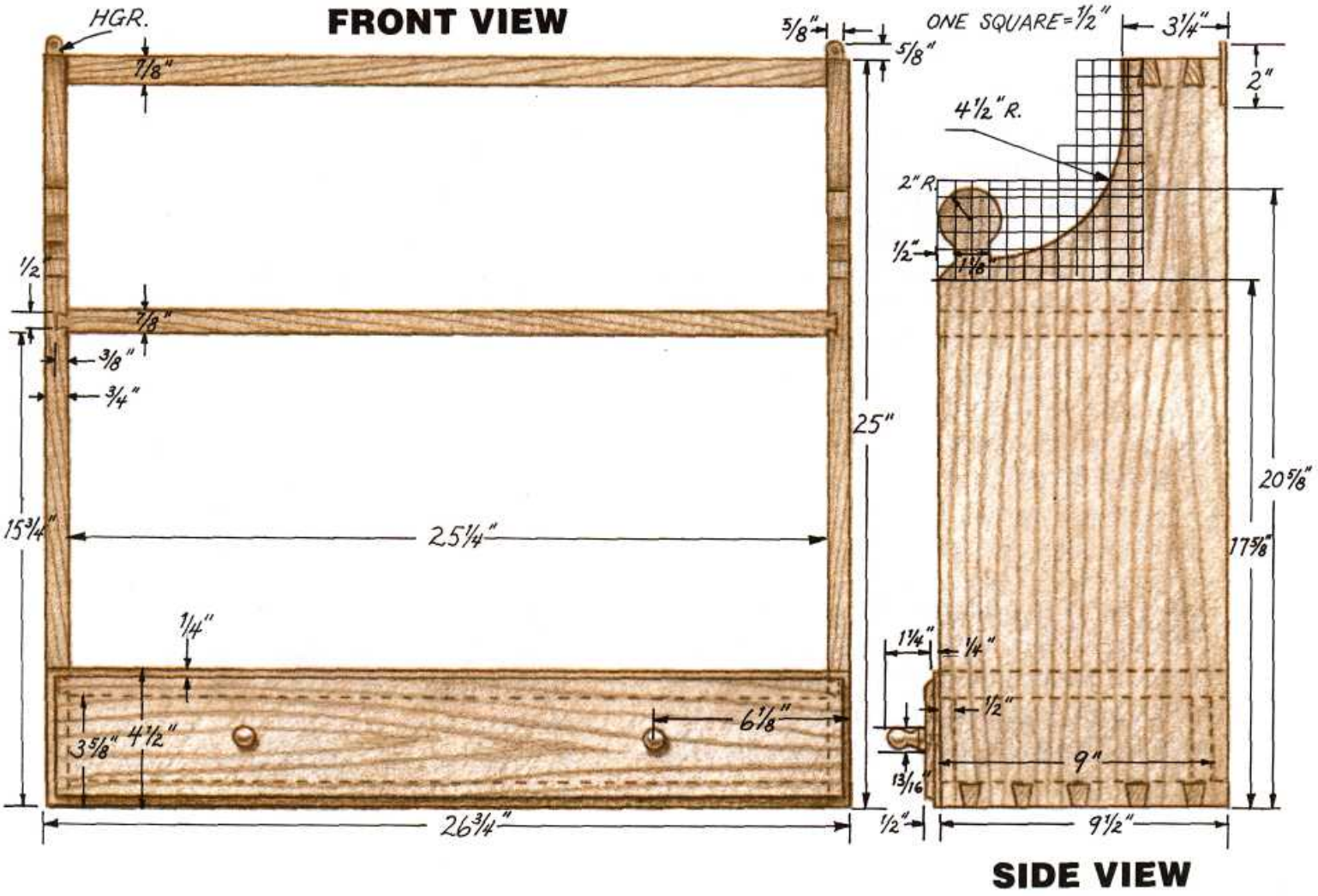
1 Select the stock and cut the parts. You can build these shelves out of almost any wood. Softwoods such as pine or fir are fine. If you choose to build the bookcase out of hardwood, good choices are red or white oak, cherry, maple, walnut, or mahogany. Choose lumber that is relatively free of knots. If you wish, select a less-expensive wood such as poplar for the drawer sides and back.

Joint, plane, rip, and cut the parts to the sizes given in the Cutting List. If necessary, glue up boards to get the wider parts.

2 Rout sliding dovetail slots in the sides. The shelves are joined to the sides with sliding dovetails. Lay out the dovetail groove on the bookshelf sides. Put a ½-inch dovetail bit in your router. Clamp a straightedge across the side and rout the dovetail groove to the depth indicated. Repeat for each shelf groove.

SHOP TIP: Dovetail grooves must be routed in one pass, and this can strain the router and leave a ragged cut. Avoid this by first routing a narrow *dado* along the path of the dovetail. Rout the dado to slightly less than the full depth with a double-fluted straight bit no wider than the top of the dovetail bit's cut (about ⅜ inch). This removes most of the waste. Follow up the dado by routing with the dovetail bit.



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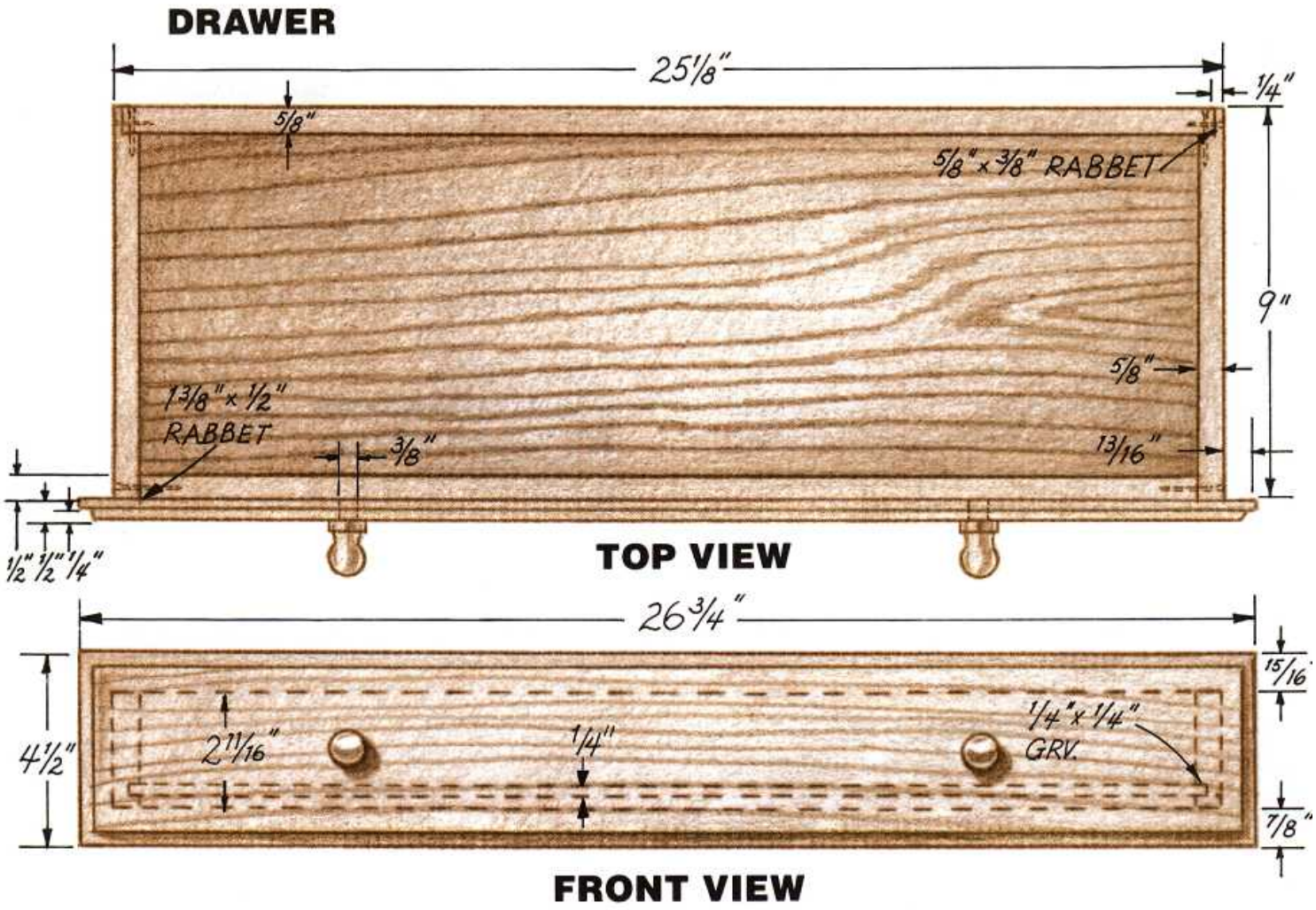
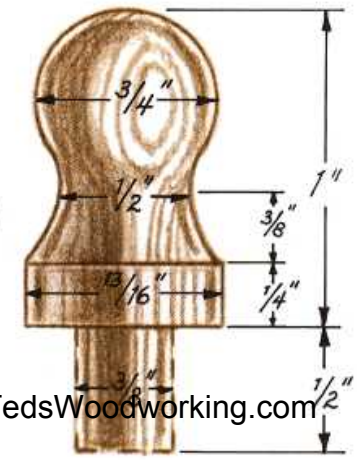


3 Cut the sliding dovetails in the shelves. Put a ½-inch dovetail bit in the router. Secure the router in your router table. Measure the depth of the dovetail groove in the bookshelf sides. Raise the router bit this amount above the table. Set the router table fence so most of the bit is partially buried in the fence. Stand the shelves upright on the table against the fence. Make one pass on each end of each shelf; flip the boards over and repeat. Test the fit in the grooves of the sides.

SHOP TIP: Test your router setup on a piece of scrap *exactly* the same thickness as the shelves. Many cabinetmakers mill an extra shelf for just this purpose. First, cut the sliding dovetail on the test piece. Adjust the router table fence to get a tail that slips in snugly, then cut the tail on the actual shelves.

4 Lay out and cut the profile in the sides. Draw a ½-inch grid on a piece of paper and draw the profile shown in the *Side View* onto it. Transfer the pattern to the wood and cut the profile with a band saw, jigsaw, or coping saw. Clean up the cut with files and sandpaper.

DRAWER PULL DETAIL



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SHOP TIP: When cutting the profile on the band saw, do not try to cut the pattern in one pass. Make several relief cuts to remove the bulk of the waste material before making the final cuts to your line.

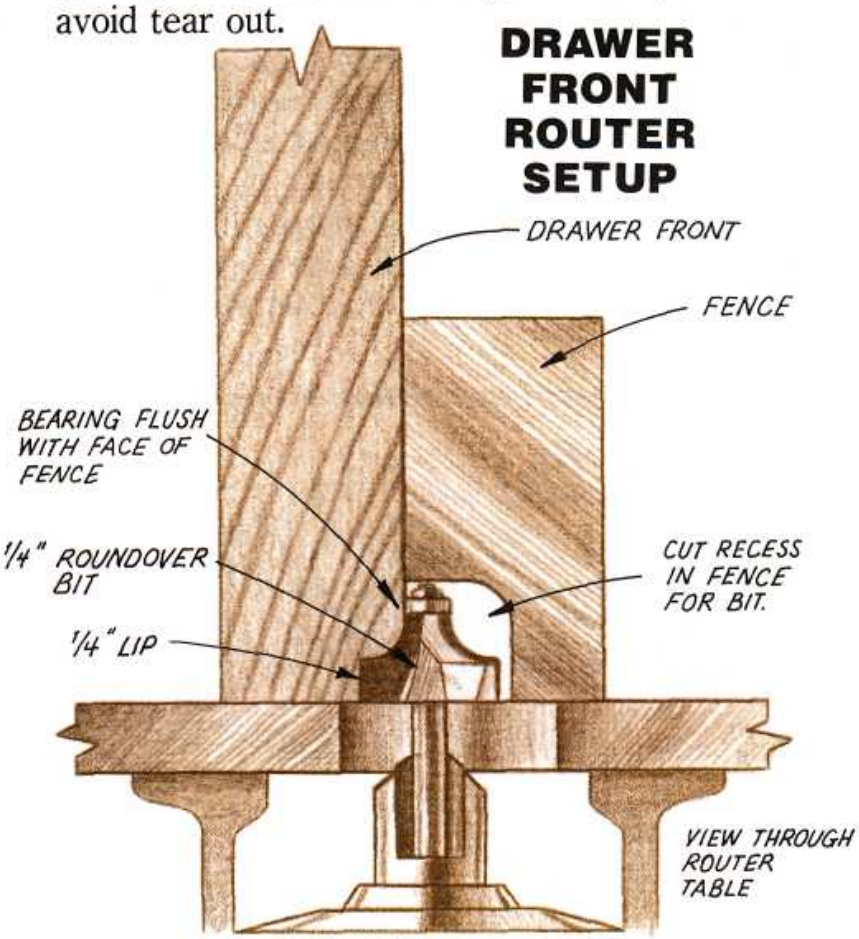
5 Lay out and cut the dovetails. The sides are connected to the top and bottom with dovetails. The joint is made up of tails and pins. Lay out the tails on the sides as shown in the *Side View.* After the tails have been cut, lay out and cut the pins on the top and bottom. If you haven't cut a lot of dovetails, practice on a piece of scrap. "Dovetailing" on page 42 shows you exactly how to cut the joint.

6 Assemble the sides to the top, bottom, and shelves. Be sure to glue up on a flat surface. Presand the interior of the bookcase. Put glue on the mating surfaces of the dovetails and clamp them together. Put glue in the sliding dovetail grooves and on the shelf dovetails. Push them together by hand. If they stick, pull them together with clamps. Put one shelf in at a time, until the front edges are flush with the bookcase sides.

Measure the bookcase across both diagonals, from corner to corner. If the bookcase is square, the measurements will be equal. If they aren't, run a clamp from corner to corner across the longer diagonal. Tighten it gently until the measurements are equal.

Sight across the front of the shelves to make sure the bookcase is not twisted. The front edges of the shelves should be parallel. If one corner of a shelf appears higher than the others, the cabinet is twisted. Push down gently on the high corner until it aligns with the others.

7 Rout the drawer front. Put a ¼-inch roundover bit in the router. Secure the router in the router table and adjust it as shown in the *Drawer Front Router Setup.* Stand the drawer front on edge and rout the detail on all four sides as shown. Rout the end grain first, to avoid tear out.



8 Lay out the rabbets for the drawer sides. Clamp the drawer front in place over the drawer opening on the bookcase and set the drawer sides in place on either side of the compartment. Reach into the drawer compartment from the rear and mark the outline of the opening on the back of the drawer front with a pencil.

9 Rabbet for the drawer sides. Put a ½-inch straight bit in the router. Secure the router in the router table. Raise the bit to a height of ½ inch and

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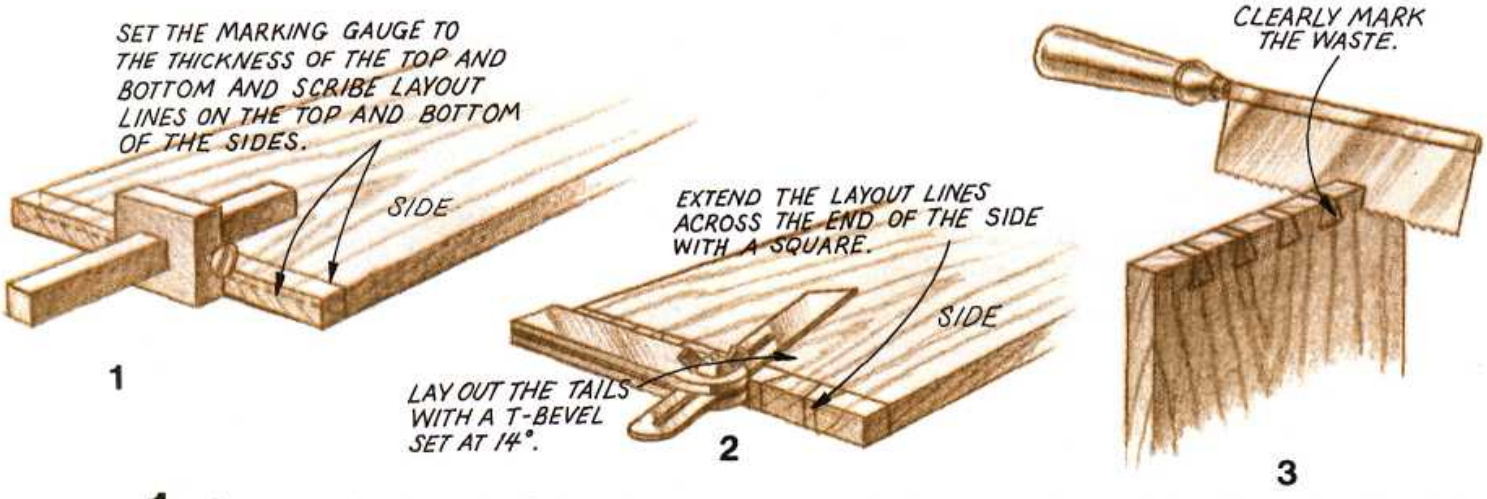
rout to the layout lines in several passes, adjusting the fence with each pass. Steady the drawer face with a miter gauge, if your router table has one, or with a 12 × 12 × ¾-inch scrap of plywood riding against the fence behind the drawer face.

10 Cut the rabbets in the drawer sides. Put a ¾-inch straight bit in the router. Secure the router in a router table and adjust the bit height and the fence to cut the rabbet on the back edge of the drawer sides. Support the drawer sides with a miter gauge or a scrap of plywood as before.

11 Rout the groove for the drawer bottom. Put a ¼-inch straight bit in the router. Secure the router in the router table. Rout a groove for the bottom ¼ inch from the bottom edge of the drawer sides and back, as shown in the *Drawer Front View.* Rout a groove in the drawer front to align with the groove in the drawer sides.

12 Make the drawer pulls. Turn the drawer pulls on your lathe to the profile shown in the *Drawer Pull Detail.* If you don't have a lathe, substitute ready-made pulls. Lay out and drill holes

DOVETAILING



1 Lay out the length of the pins and tails. Set a marking gauge to the thickness of the top and bottom—⅞ inch, in this case. Scribe a line around the top and bottom of the sides. Then set the marking gauge to the thickness of the sides—¾ inch—and scribe a line around both ends of the top and bottom.

2 Lay out the tails. First, lay out the tails as shown in the *Side View* with a sliding T-bevel set at 14 degrees in this case. Then, extend the layout lines across the end grain of the side with a square. Next, lay out the angle of the tails on the back face of the board, so that they meet the lines you drew on the end grain.

3 Cut out the tails. Saw down to the scribe line, cutting on the waste side of the layout lines. A Japanese Dozuki saw, like the one shown here, is easy to control and cuts crisp lines. Watch your layout lines carefully: Follow the angle of tails and make sure you don't cut

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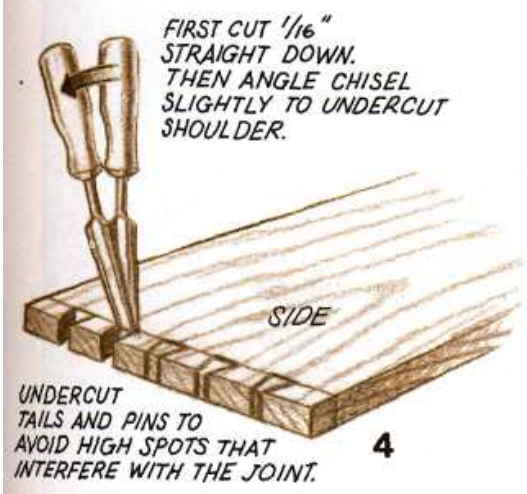
for the pulls in the drawer front as shown in the *Front View.*

13 Assemble the drawer. Presand the drawer interior and assemble the drawer on a flat surface. Glue and nail the sides into the rabbet you routed in the drawer face. Slip the drawer bottom into the grooves. Nail and glue the drawer back into the rabbets in the drawer sides. If you are making your drawer from hardwood, predrill all of the nail holes to avoid splitting. Make sure that the drawer is square.

14 Apply the finish and attach the hangers. Finish sand the bookshelf. Stain and varnish or paint your bookshelf to match your decor.

When the finish is dry, attach the hangers to the back of the bookshelf. You can buy hangers similar to the ones shown from most hardware stores, or you can order them from the source given in the Cutting List. Position the hangers as shown in the *Front View.* Trace around the hangers and rout recesses for the hangers. Screw the hangers in place.



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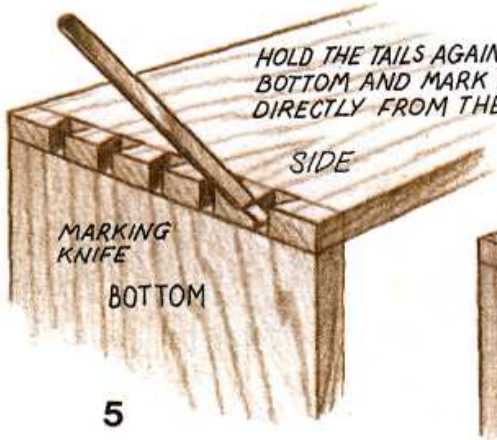

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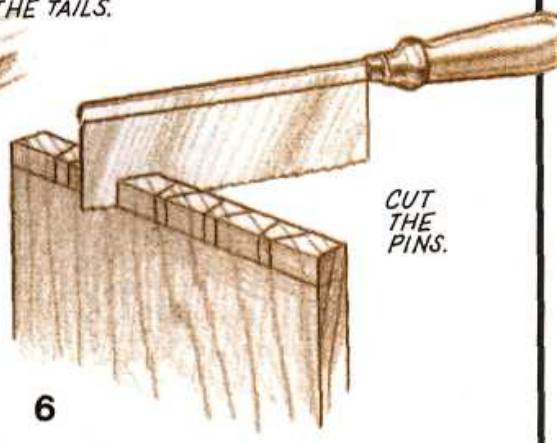

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through either one of the scribe lines.

4 Remove the waste between the tails. Chisel halfway through the board from one side; turn the board over and chisel from the other side. Undercut slightly as shown to ease assembly of the joint.

5 Lay out the pins. For best results, lay out the pins by tracing around the tails. Hold the tails against the end grain of the top and bottom and trace around the tails with a marking knife. Carry your layout lines down to the scribe lines and clearly mark the waste with a pencil.

6 Cut out the pins. Saw along the layout lines to the scribe lines, and chisel away the waste as before. Test fit the dovetails. Pare the pins to fit the tails if necessary. Do not glue them in place until you have finished the rest of the cabinet.

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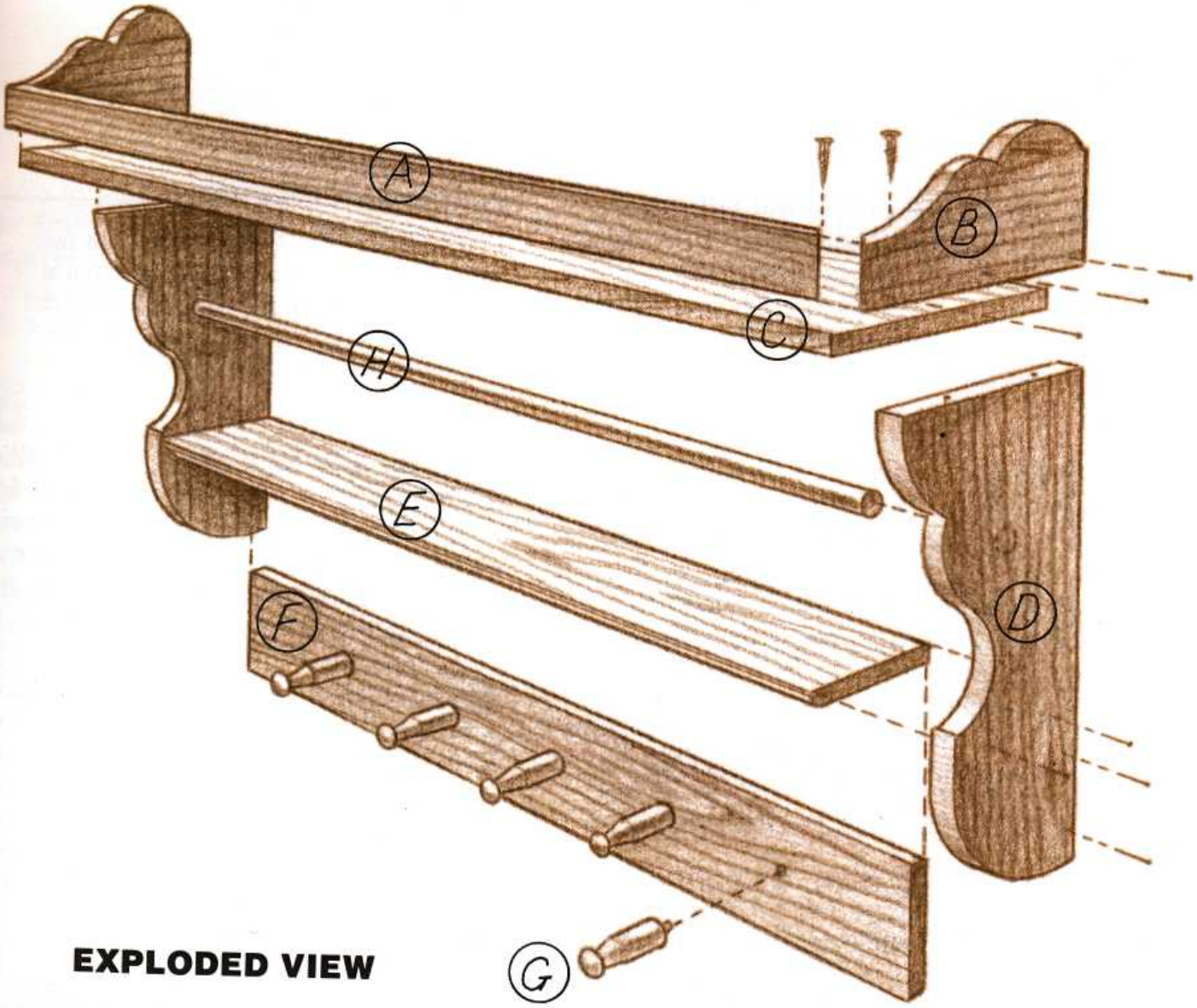
PEG SHELF



EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Front rail	1	½″ × 2″ × 48″	Miter to fit.
B. Side rails	2	½″ × 5″ × 9″	Miter to fit.
C. Upper shelf	1	¾″ × 8″ × 45¾″	
D. Brackets	2	¾″ × 7″ × 17″	
E. Lower shelf	1	¾″ × 4″ × 37″	
F. Peg support	1	¾″ × 5″ × 37″	
G. Mug pegs*	5	¾″ dia. × 3⅜″	Overall dimension
H. Dowel	1	¾″ dia. × 37¾″	

*Mug pegs are available from Cherry Tree Toys, Inc., P.O. Box 369, Belmont, OH 43718. Part #143 (maple, oak, cherry, or walnut).

Hardware

As needed, 4d finishing nails
4 #8 × 1¼-in. flathead wood screws
2 brass hangers. Available from Cherry Tree Toys, Inc. Part #2710-A.

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1 Select the stock and cut the parts. The shelf pictured is made from pine, but you can make yours from whatever wood you have. Choose straight, flat stock. Joint, plane, rip, and cut the parts to the sizes given in the Cutting List.

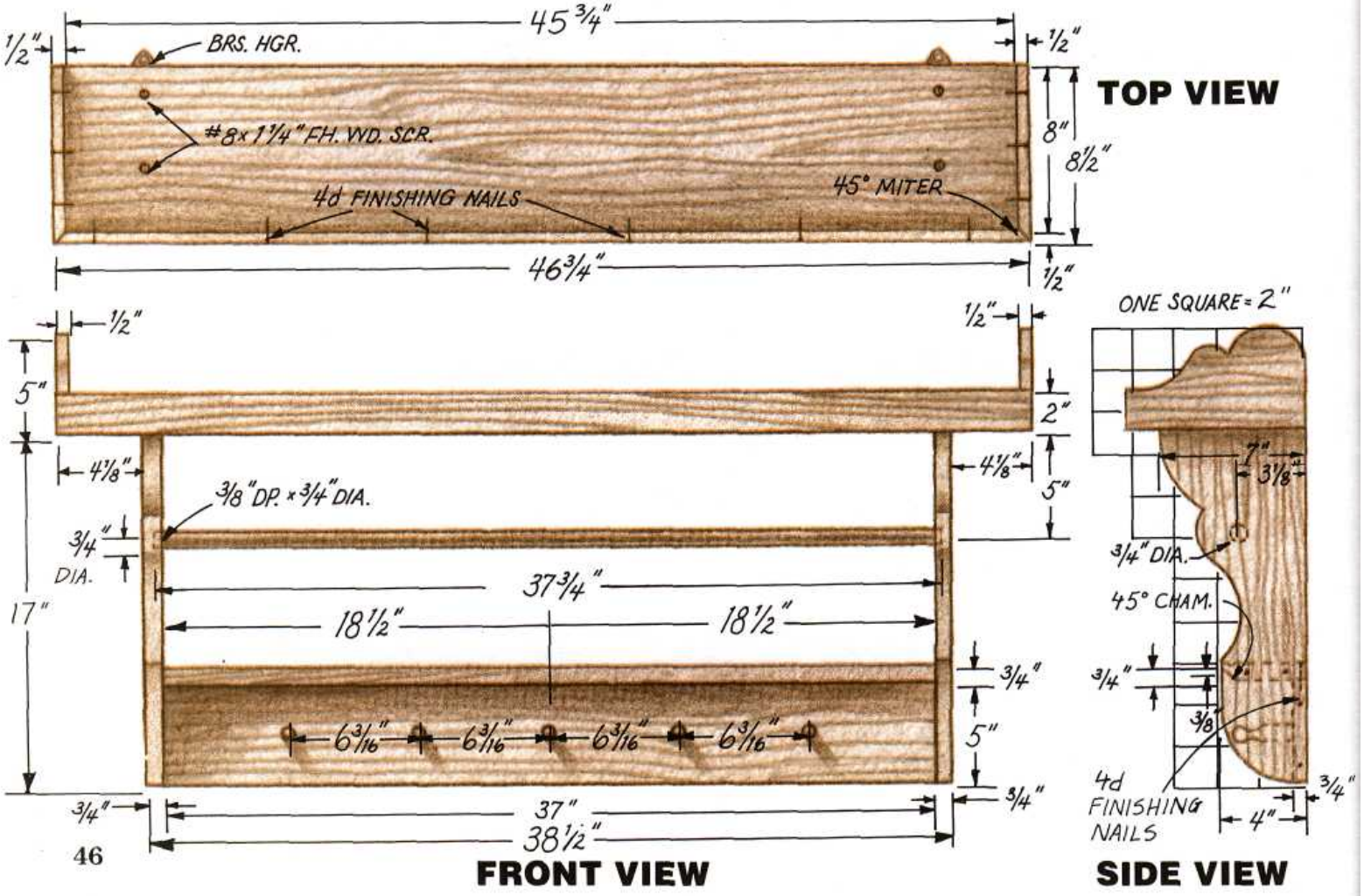
2 Cut the miters. Cut miters in the front rail and side rails to fit around the upper shelf. Test fit the rails.

3 Make a paper pattern and cut the parts to shape. Draw a 1-inch grid on a large sheet of paper and draw the bracket and side rail patterns onto it. Transfer the patterns to the wood. Cut the shapes using a band saw or jigsaw.

SHOP TIP: To get two pieces with identical curves, cut both at once. First stack the pieces together and secure by putting double-sided tape between them. Then cut both brackets in one operation.

4 Assemble the upper shelf. Glue and nail the front rail to the front edge of the top shelf. Make sure that the mitered ends are even with the corners of the upper shelf. Nail, but do not glue, the side rails to the upper shelf.

5 Chamfer the front edge of the lower shelf. Set your table saw blade to 45 degrees. Place the table saw



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fence to the left of the blade and position the fence to cut the chamfer on the front edge of the lower shelf. Make sure that you leave a 3/8-inch unchamfered edge as shown in the *Side View.*

6 Drill the peg holes and attach the lower shelf to the peg support. The mug pegs for this shelf are commercially made, and the diameter of the shank sometimes varies slightly. To make sure the pegs will fit in the holes drilled for them, drill a sample ½-inch hole in a piece of scrap wood. The peg should fit snugly. If not, change drill bits as necessary. When you have found the proper drill bit, lay out and drill the peg holes in the peg support as shown in the *Front View.* Nail and glue the lower shelf to the top edge of the peg support as shown in the *Side View,* but don't attach the mug pegs yet.

7 Mark and drill the dowel holes. Mark the brackets for the dowel holes as shown in the *Side View.* Before you drill, make sure that your markings are both on the *inside* edge of the brackets. Drill a 3/8-inch-deep by 3/4-inch-diameter hole into each bracket.

8 Assemble the peg shelf. On a flat surface, test fit the peg shelf and make any necessary adjustments. Put the dowel in place and glue and nail the lower shelf and peg support assembly to the brackets.

When you have assembled the lower section of the peg shelf, center the upper shelf on the brackets. Make sure that the back of the upper shelf is even with the back of the brackets. Screw and glue the upper shelf to the brackets.

SHOP TIP: Mark and drill recess and pilot holes through the top shelf and into the brackets with a combination pilot hole bit. These bits drill a hole for the plug, a clearance hole for the screw shank, and a slightly smaller pilot hole for the screw threads. Combination pilot hole bits are available at most hardware stores and are sold according to the screw size.

9 Attach the mug pegs. Apply a small amount of glue to the base of the mug pegs and insert them into the peg holes.

10 Apply finish. Countersink the nails and fill the nail holes with wood putty. Finish sand the peg shelf, rounding the edges slightly as you sand. Finish the peg shelf in any way you choose. The one pictured has a natural finish, which allows the wood grain to show through.

When the finish has dried, attach the brass hangers to the back edge of the top shelf.

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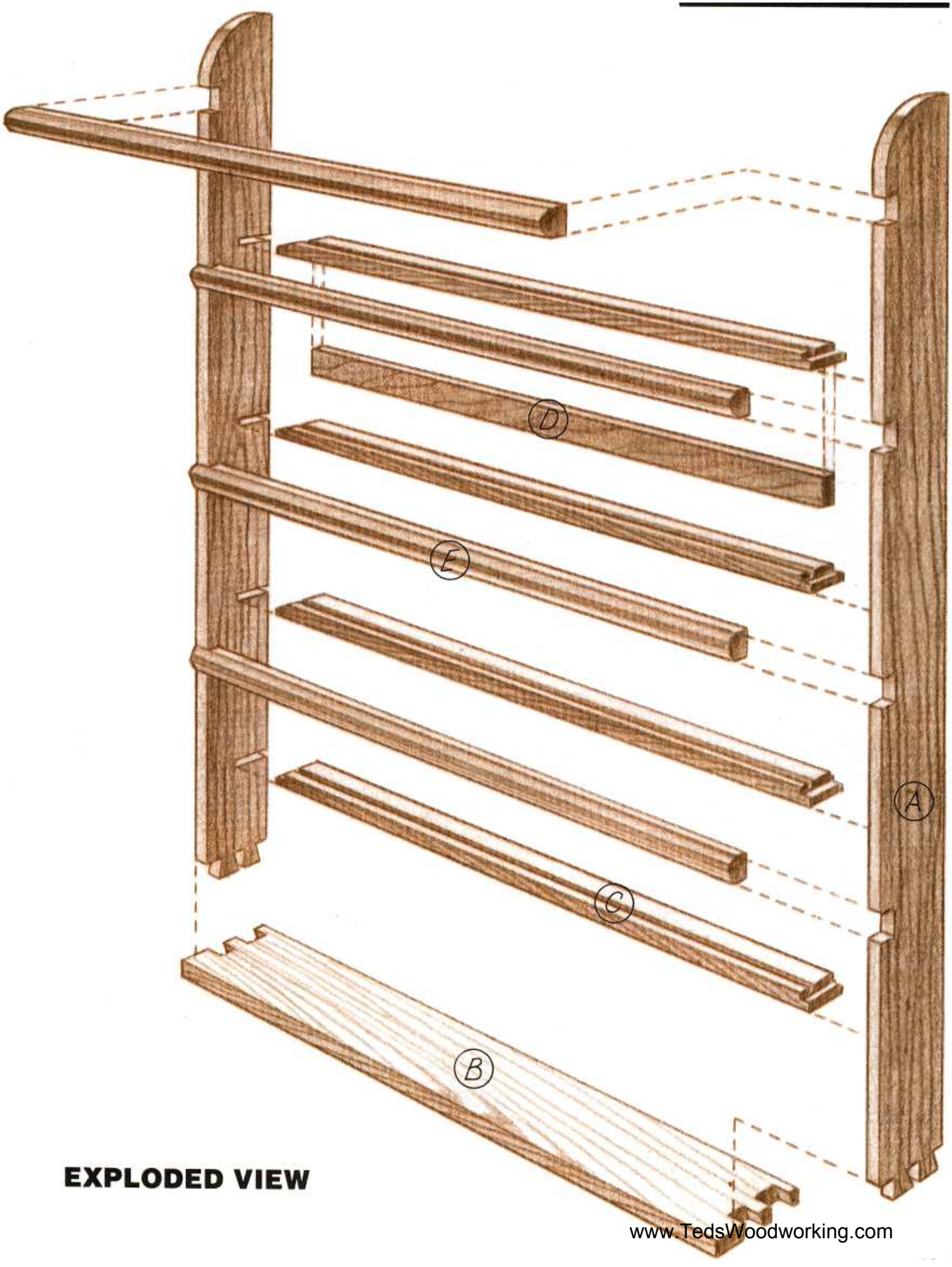
PLATE RACK



EXPLODED VIEW

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1 Select the stock and cut the parts. Choose straight, flat stock without knots. Joint, plane, rip, and cut the parts to the sizes given in the Cutting List.

2 Lay out and rout the dadoes in the sides. Lay out the dadoes for the shelves on the sides as shown in the *Side View Joinery Detail.* Put a ½-inch straight bit in your router and set it up to cut a ⅜-inch-deep dado, as explained in "Routed Dadoes" on page 52.

3 Rabbet the shelves. The end of each shelf is rabbeted to fit the dadoes. Rout the rabbets in the shelf ends with the router and bit you used to rout the dadoes in the sides. Secure the router in a router table and adjust the bit and fence to cut a ¼ × ⅜-inch rabbet in the shelf ends as shown in the *Shelf Detail.* Check the fit by routing the rabbet in a scrap piece and fitting it into one of the dadoes in the sides. Guide the cut with a miter gauge, if your router table has one, or with a 12 × 12 × ¾-inch scrap of plywood riding against the fence and behind the shelf.

4 Rout the plate groove in the shelves. To rout a plate groove in each shelf, put a 45-degree "V" grooving bit in the router. Secure the router in a router table and set it up to cut a ¼-inch-deep groove as shown in the *Groove Detail.* Set up a fence and guide the shelves against it as you rout the plate groove shown in the *Groove Detail.*

5 Notch the sides for the shelf rails. Lay out ⅝-inch-deep by 1¼-inch-wide notches for the shelf rail as shown in the *Side View Joinery Detail.* Cut the notches with a dado blade in your table saw. Put the side on the table with the front edge down and guide the cut with a miter gauge set at 90 degrees.

SHOP TIP: To get two identical notches, cut both at once. Stack the pieces together with the shelf dadoes facing in and the front edges aligned with each other and secure by putting double-sided tape between them. Then cut both notches in one operation to ensure perfect notch alignment.

CUTTING LIST

Part	Quantity	Dimension
A. Sides	2	¾" × 4" × 50"
B. Bottom	1	¾" × 5" × 32½"
C. Shelves	4	¾" × 2" × 33¼"
D. Hanging strip	1	¾" × 1¼" × 32½"
E. Shelf rails	3	1" × 1¼" × 34"

Hardware

8 4d finishing nails

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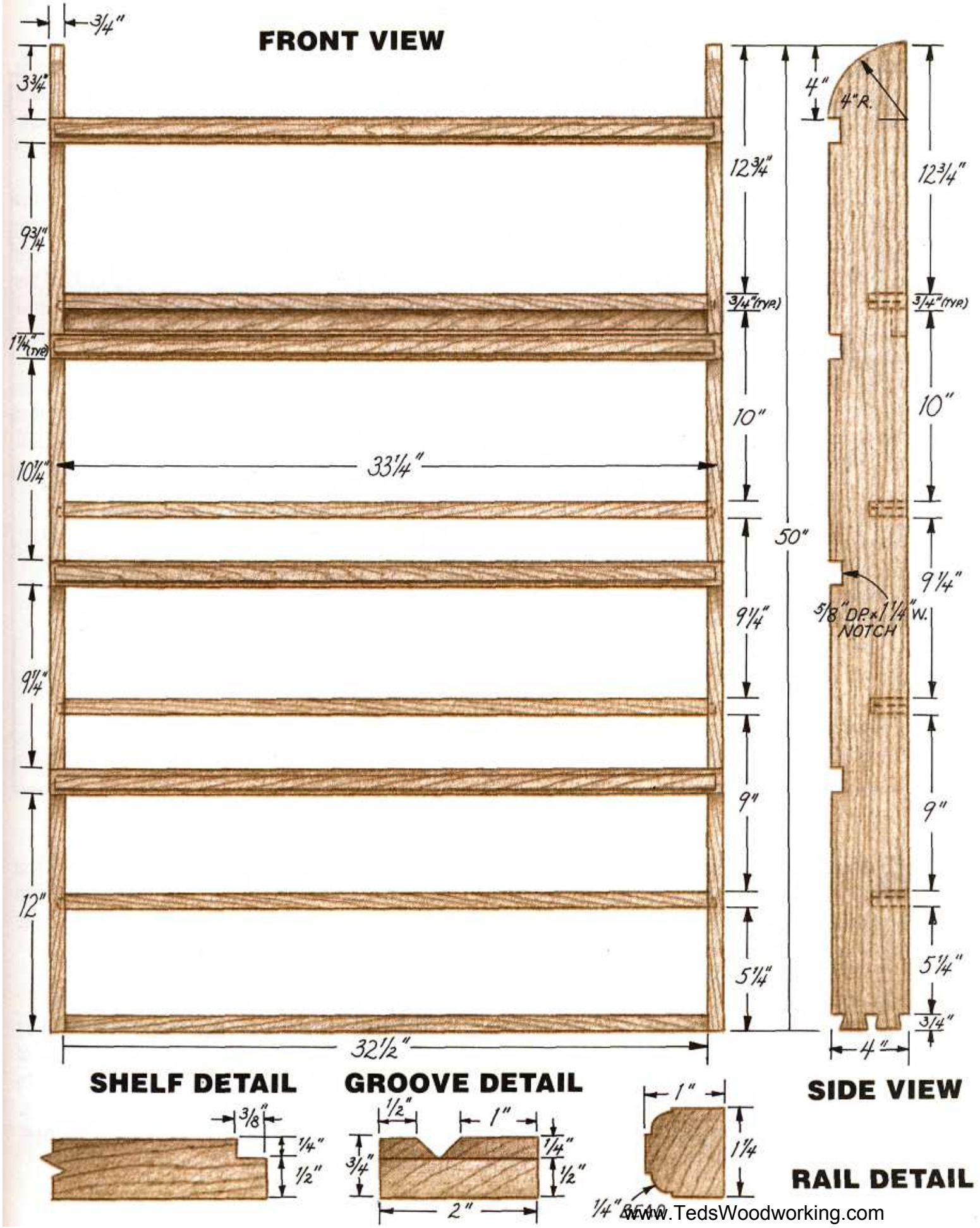

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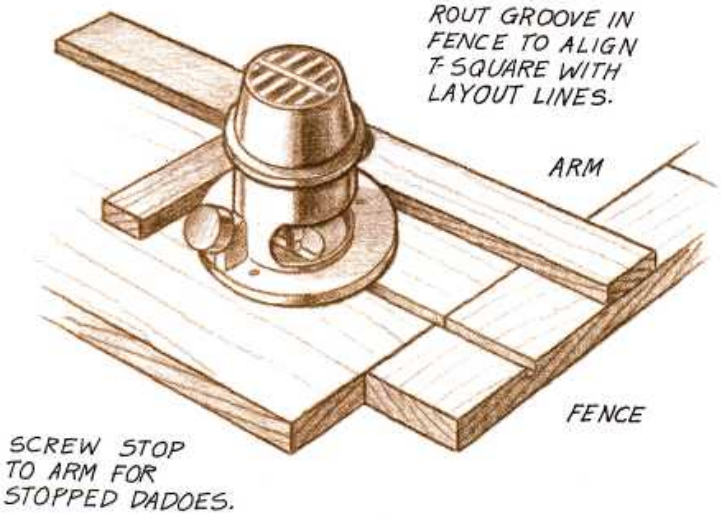
ROUTED DADOES



1 Make a T-square. Screw together two pieces of hardwood at right angles, as shown. Make the square out of a durable hardwood.

2 Rout an index groove. To determine exactly where the router will cut, put the bit you plan to use in it and rout a shallow groove in the head of the T-square.

3 Lay out dadoes on the stock. Lay out the dadoes with a sharp pencil and align the index groove with the layout lines. Clamp the T-square in place.

4 Rout the dadoes. Set the router to cut a groove about ⅛ inch deep. Rout the dado by guiding the router along the arm of the T-square. Rout the dado in a series of passes, each about ⅛ inch deeper than the last.

If the dadoes stop at one end, as those on the plate rack do, attach a stop block to the fence so that each dado will be exactly the same length. Lay out and rout a test dado in a piece of scrap wood. When you have determined the length of the dado, screw a block to the T-square arm to keep the router from traveling any farther.

6 Rout the front edges of the shelf rails. Rout the rails to the profile shown in the *Rail Detail.* Put a ¼-inch beading bit in a router. Secure the router in a router table and rout all around the front edge, starting with the end grain to eliminate tear out. Guide the end grain cuts with a miter gauge or plywood scrap.

7 Cut the curve on the top of the sides. Lay out the curve on the top of the sides as shown in the *Side View Joinery Detail.* Cut the sides to shape with a jigsaw or band saw and sand away the saw marks.

8 Cut the dovetails in the sides and the pins in the bottom. Lay out and cut the dovetails on the side of the rack. Use the tails as a template to lay out the pins on the bottom of the rack. For more on cutting dovetails, see "Dovetailing" on page 42.

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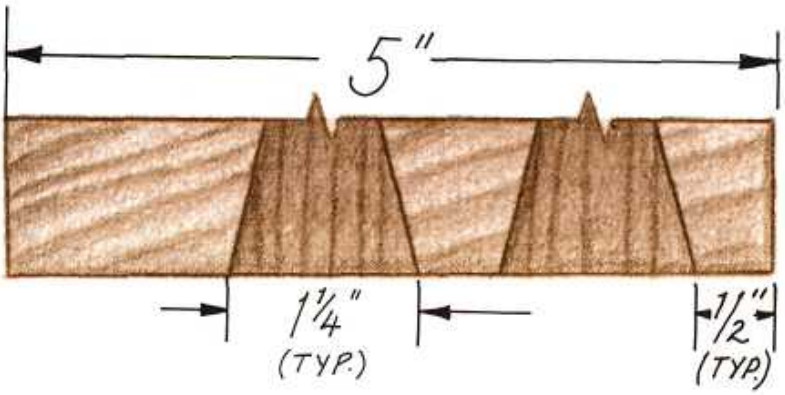
9 **Assemble the plate rack.** Sand any surfaces that will be difficult to reach once the rack is assembled. Be careful not to sand any of the joinery.

Assemble the plate rack beginning with the bottom. Coat the inside of the pins with glue and press the bottom into the sides. Put a small amount of glue in each dado and slide the shelves into place. Glue and clamp the hanging strip to the underside of the top shelf.

Next, put a little glue in the shelf rail dadoes in the sides, position the rails, and nail them in place with 4d finishing nails. If necessary, clamp across the sides to hold the dovetails tight while the glue sets.

10 **Finish the plate rack.** When the glue is dry, remove any excess glue and finish sand the plate rack. As you sand, round-over the edges of the plate rack slightly to give it a softer look. The plate rack shown has a clear varnish finish. You can do the same, but feel free to finish your plate rack in a way that will best fit your decor.

11 **Hang plate rack.** Select a spot on the wall for the rack and locate the studs in the wall. Drill clearance holes in the hanging strip that will align with the studs. Screw the shelf to the studs.



JOINERY DETAIL

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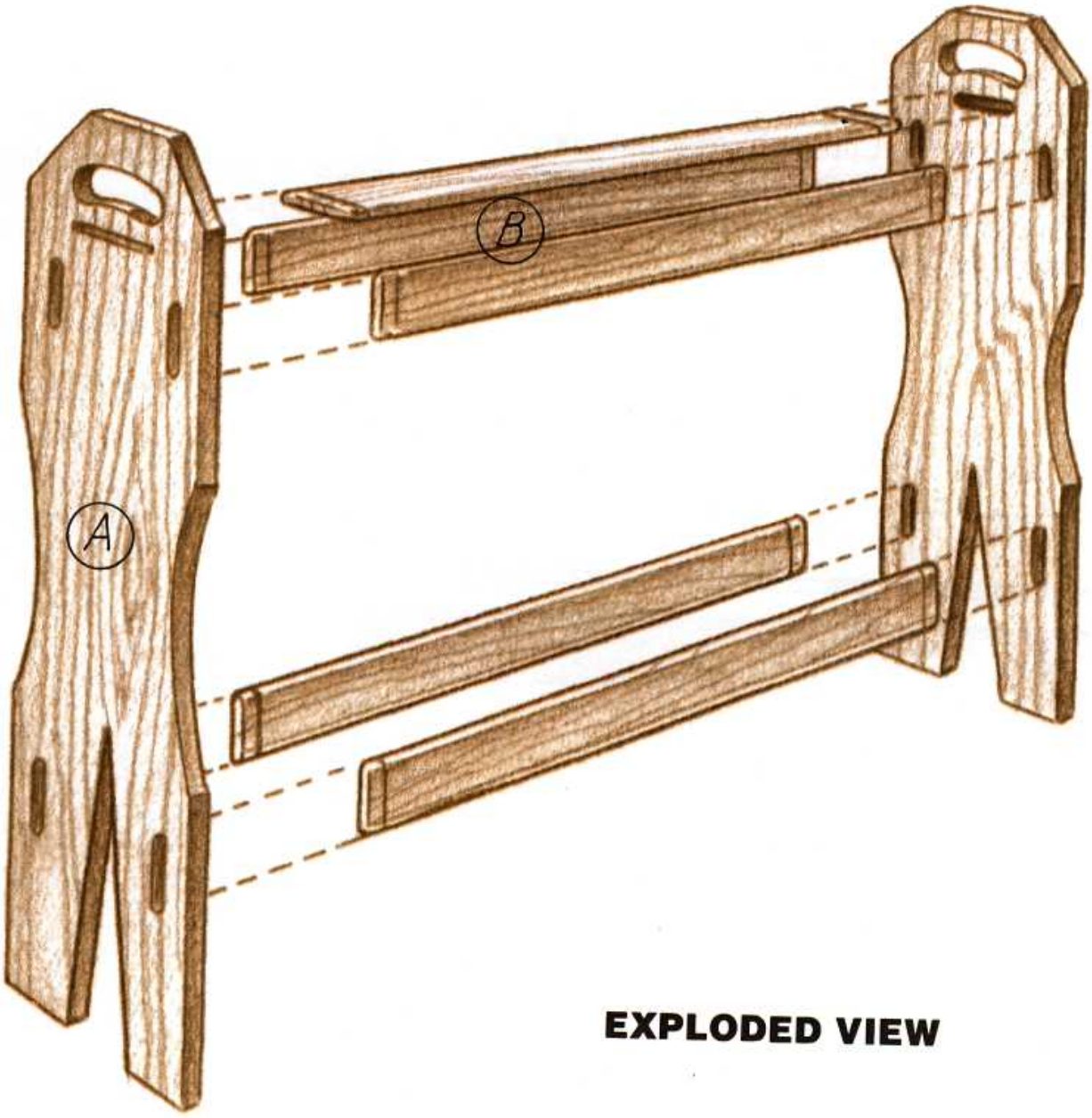
QUILT RACK



EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Sides	2	¾″ × 9″ × 34″	Final length is 33″.
B. Slats	5	½″ × 2½″ × 29¾″	

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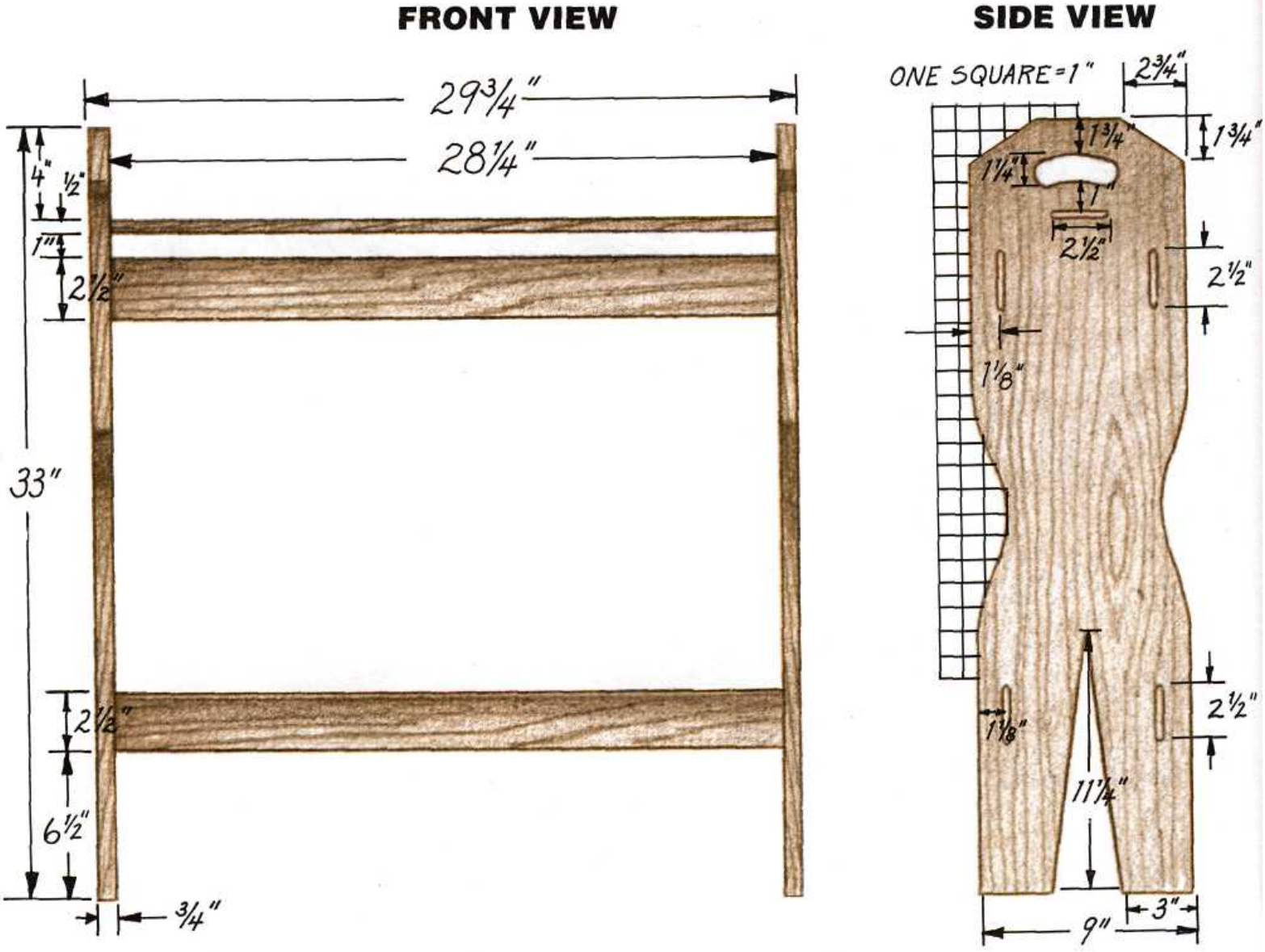
1 Select the stock and cut the parts. Joint, plane, rip, and cut the parts to the sizes given in the Cutting List. You can cut the sides from 1 × 10s and the slats from ½-inch-thick stock that's usually used for doorjambs. The dimension given in the Cutting List for the sides is longer than necessary to make routing the mortises easier. You will cut the legs to the exact length later.

2 Cut vertical mortises in the sides. The eight vertical mortises are cut on a single router table setup. Put a ¼-inch straight bit in your router. Secure the router in a router table and adjust it to cut ¼ inch deep. Position the fence 1⅛ inches from the bit. Clamp stops to the fence at the positions illustrated in *Routing the Vertical Mortises.*

To rout the mortises, put a side



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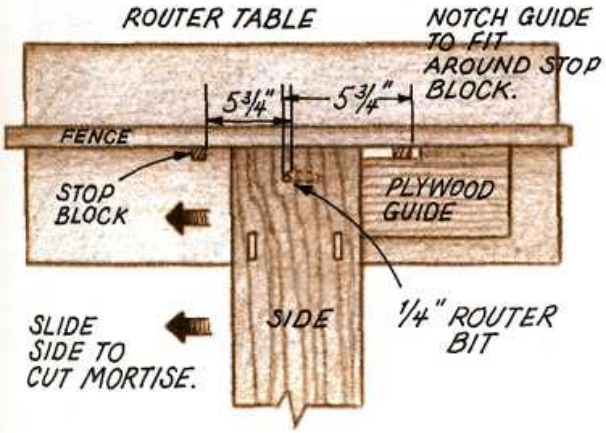
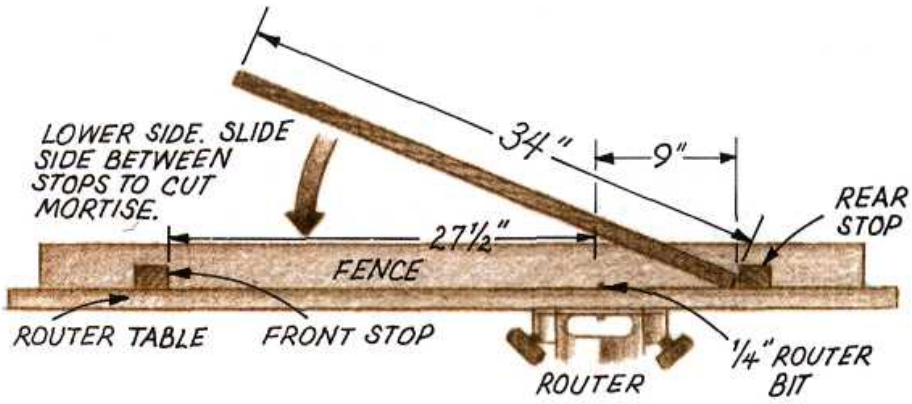


ROUTING THE HORIZONTAL MORTISES



ROUTING THE VERTICAL MORTISES

against the rear stop and lower the it into the bit, as shown in *Routing the Vertical Mortises*. Move the side forward until it hits the other stop. Raise one end of the side to remove it from the router table. Repeat for the remaining vertical mortises. Raise the bit another ¼ inch or so, repeat the process, and then raise the bit to a little over ¾ inch so it cuts through the side on the third round of cuts.

3 Cut horizontal mortises in the sides. Cut the extra length off one end of the sides. Rout the mortises with a two-stop router-table setup as before. This time, set the fence 4 inches from the router bit and set the blocks at the dimensions shown in *Routing the Horizontal Mortises*. Guide the freshly cut end along the fence with a miter gauge. Square the edges of each mortise with a ¼-inch chisel.

SHOP TIP: If your router table doesn't have a slot for a miter gauge, use a piece of plywood, as illustrated, to guide the stock along the fence. Cut a notch in the plywood to fit around the stop block.

4 Shape the sides. Draw a ½-inch grid on a piece of paper and draw the curve in the sides onto it. Transfer the pattern to the wood. Lay out the angled cuts on the top of one side as shown in the *Side View*. Clamp the sides together, align them carefully. Cut the curves on a band saw or jigsaw. Cut the angles with a jigsaw or circular saw. Sand the sawed edges.

5 Cut the handholds. With the sides still clamped together, lay out the handholds as shown in the *Handhold De-*

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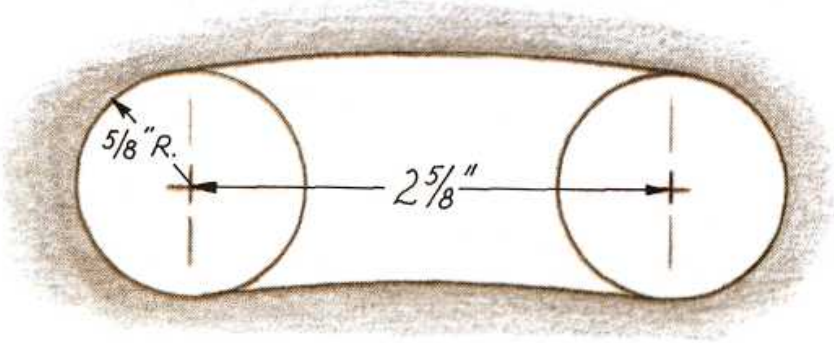
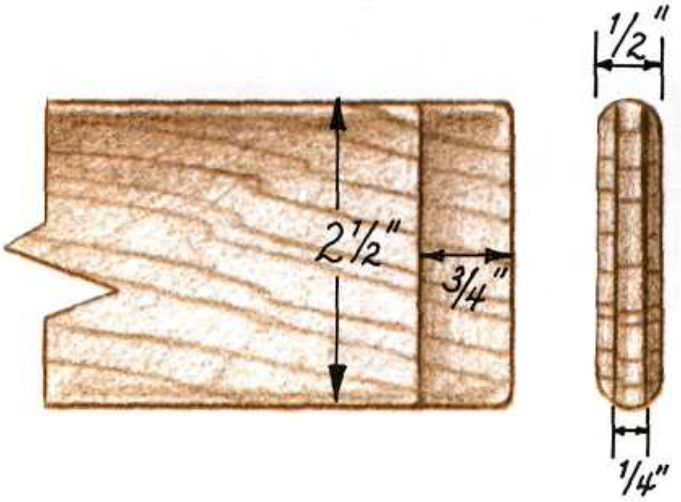
tail. Use a compass to draw two ⅝-inch-radius circles with their centers 2⅝ inches apart. Connect the circles with lines at top and bottom, both curving slightly upward. Drill out the circles with a 1¼-inch bit and complete the cuts with a jigsaw.

6 Make the slats. To round-over the slats to the profile shown in the *Tenon Detail* put a ¼-inch roundover bit in the router. Secure the router in the router table and make the cut, guiding the slat against a fence.

Set up a dado blade in your table saw to cut the tenons in the end of the slats. Test the cut on a piece of scrap and adjust the height of the blade to get a tenon that fits snugly in the mortise. Cut tenons on both ends of each slat.



HANDHOLD DETAIL



TENON DETAIL

SHOP TIP: To get perfectly aligned shoulders on the tenons, guide the cut against the table saw fence. First, screw a straight, surfaced length of wood to the fence to protect it. Set the fence so the ¾-inch-wide dado blade just touches it. Guide the stock over the cutter with the miter gauge. Turn the stock over and repeat.

7 Apply finish. Finish sand the parts. The quilt rack shown has a light brown stain and is finished with shellac.

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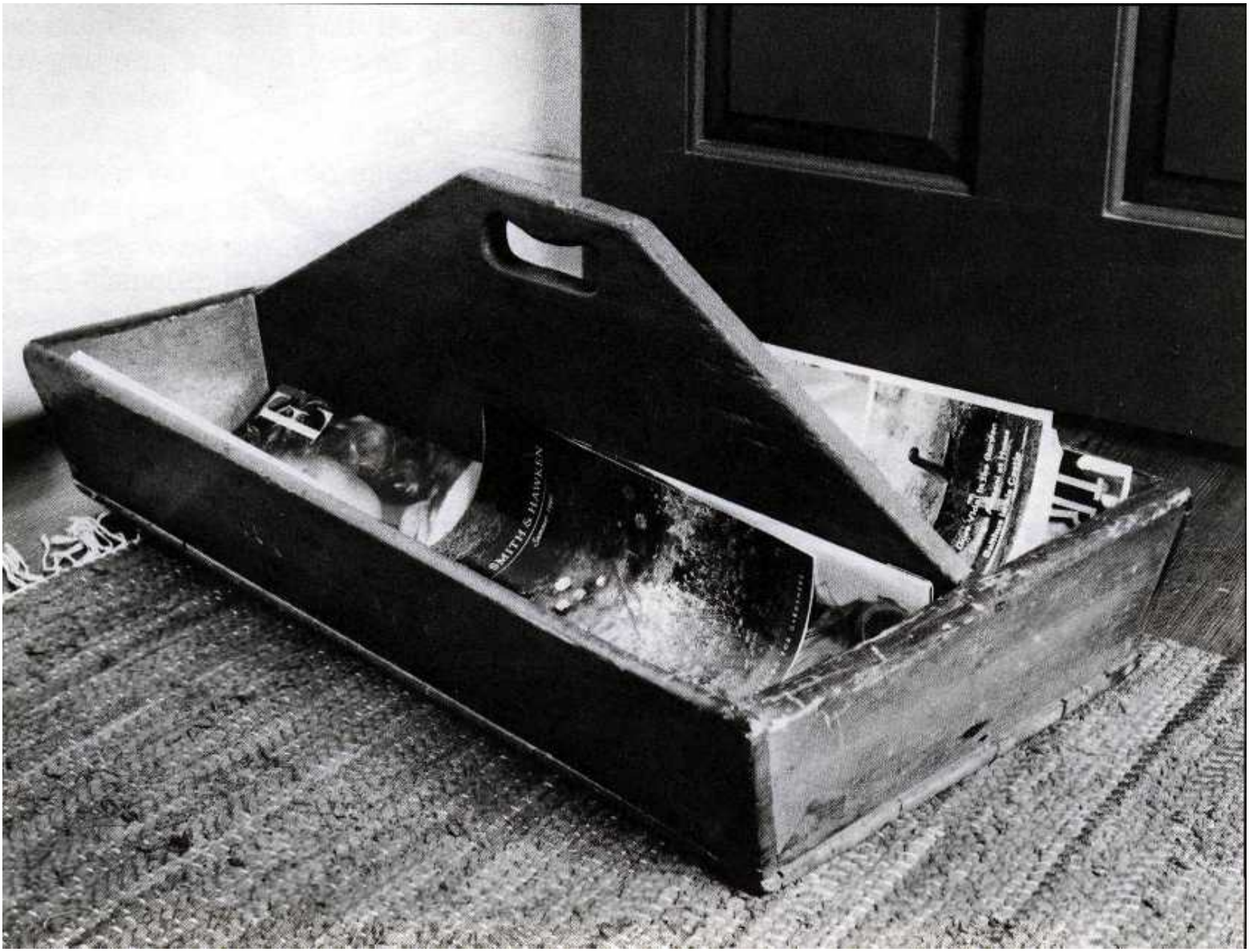
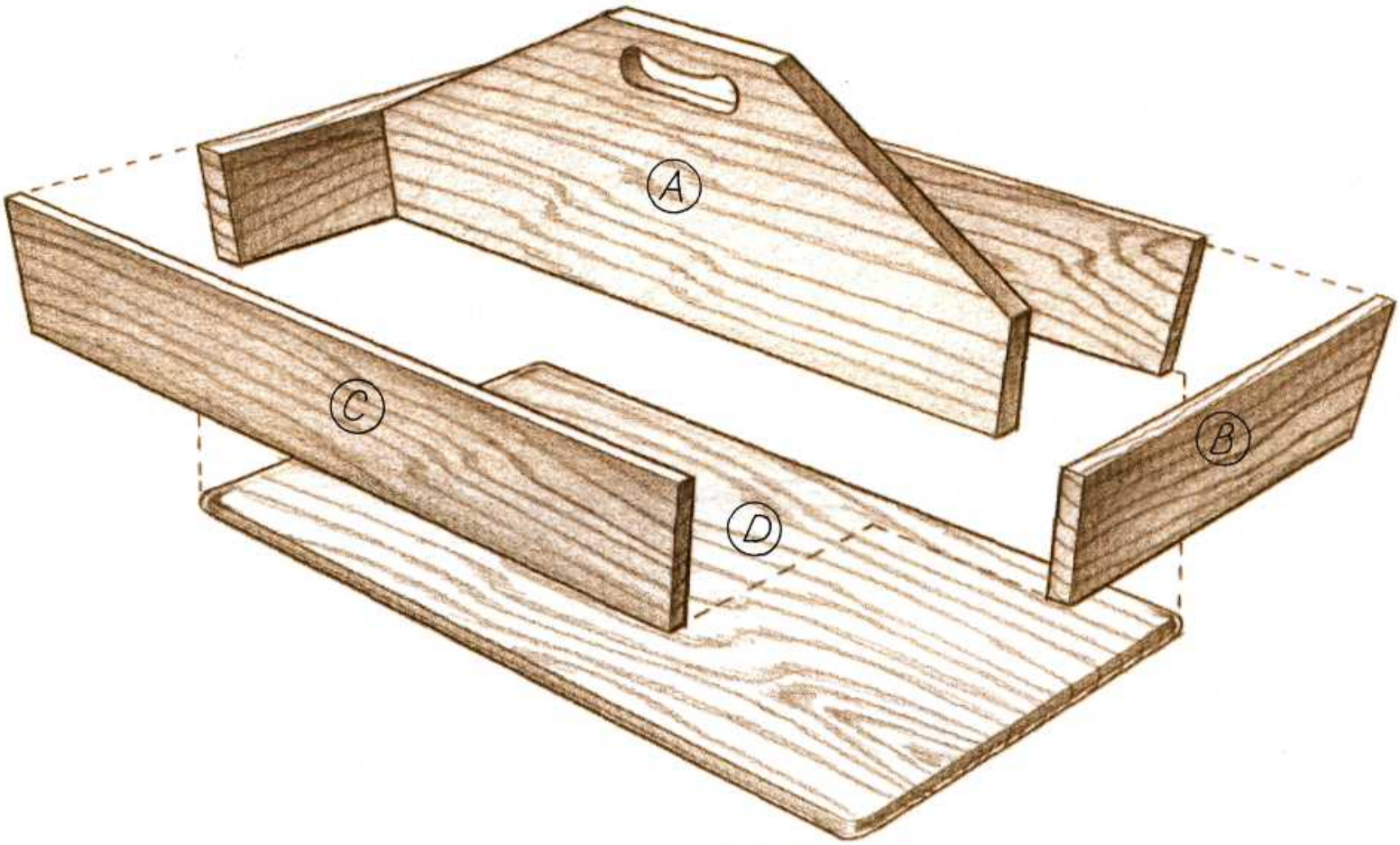
MAGAZINE RACK





EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Divider	1	¾″ × 9⅝″ × 27″	Cut to pattern.
B. Ends	2	¾″ × 4½″ × 15″	Cut to pattern.
C. Sides	2	½″ × 4½″ × 27″	Cut to fit.
D. Bottom	3	½″ × 12⅝″ × 26″	

Hardware

As needed, 4d square-cut nails

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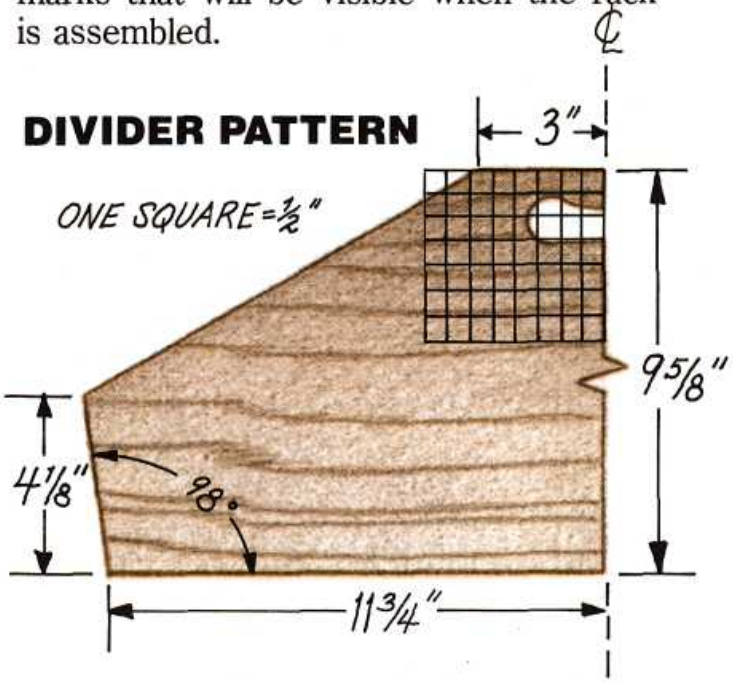
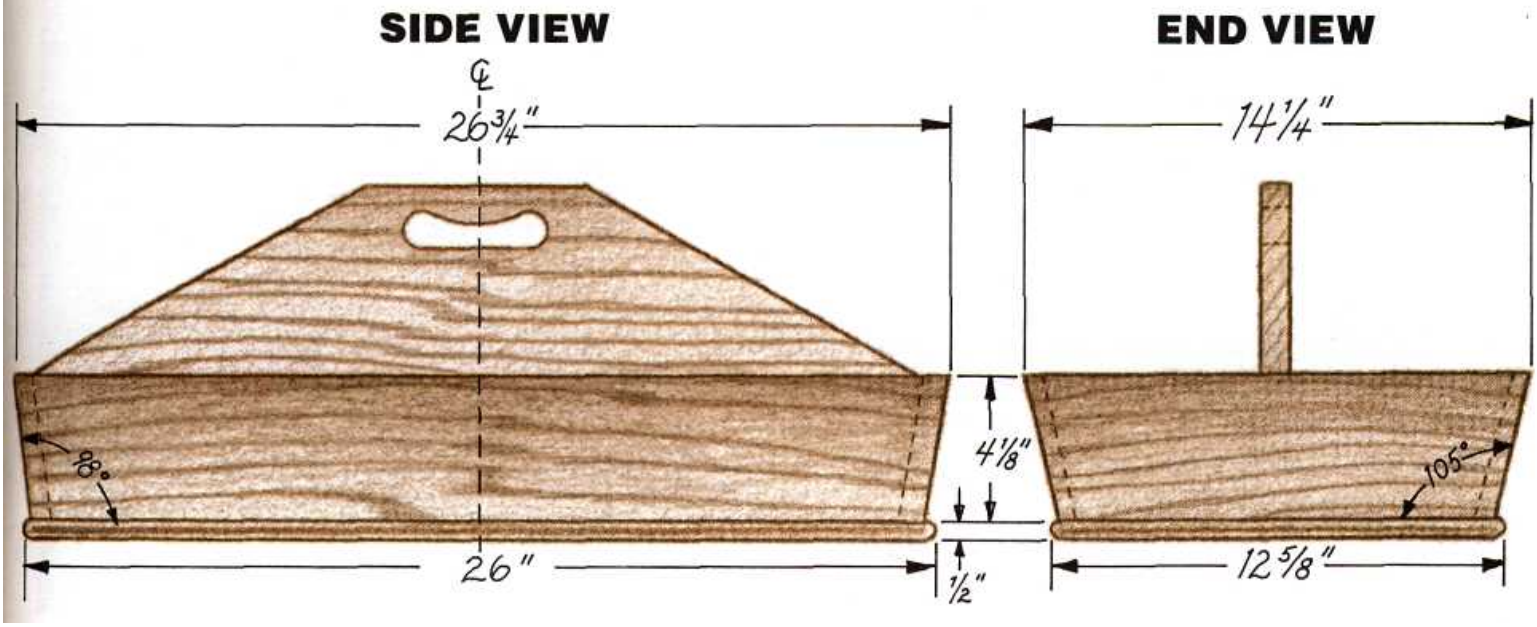
1 Select the stock and cut the parts. The tote is made up of four basic parts: divider, ends, sides, and bottom. Joint, plane, rip, and cut the parts to the sizes given in the Cutting List. The dimensions for the divider, end, and sides are all slightly long. You will cut them to size as you make the rack.

2 Cut out the divider. Lay out the shape of the divider directly on the wood. First, draw a 23½-inch-long line along the bottom. Draw 98-degree angles on each end of the line, as shown in the *Divider Pattern*. Mark where they end on the board. Draw the 6-inch straight section along the top of the divider. Connect the end of the angles with the end of the straight section to lay out the long slope of the divider.

Cut out the ends of the divider on your table saw with the miter gauge set to 8 degrees. Cut the long slope with a saber saw, hand saw, or circular saw. Drill 1-inch-diameter holes for the handle, as shown in the pattern. Sketch a curve that approximates that shown on the grid. Cut out the rest of the handle with a saber saw or coping saw. Sand away any saw marks that will be visible when the rack is assembled.



3 Bevel the ends and sides. Rip the end and side pieces to the profile shown in the *End Pattern, End View* and *Side Pattern, End View.* Cut two 105-degree angles on each end, as shown in the *Front View,* cutting the ends to length in the process.



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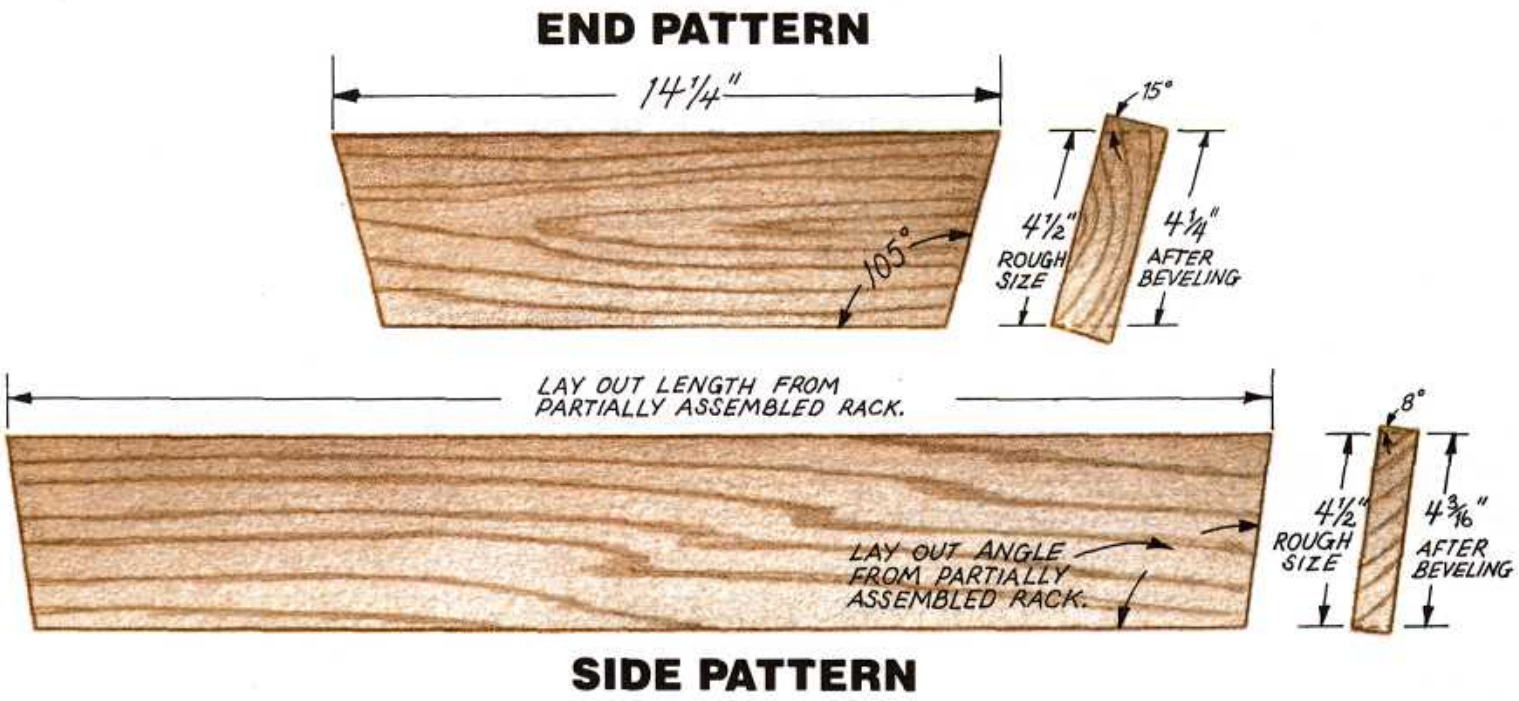

4 Nail the ends to the divider. Mark a centerline on the end grain of the divider and the inside face of each end. Put the divider in a vise, align the centerlines, and nail the ends in place.

5 Cut the sides to fit. Butt the sides in place against the ends and trace the angle of the ends on them. Set the miter gauge on the table saw to cut along the lines, then nail the sides in place. With a file or coarse sandpaper, round the top edges of the frame and the outer edge of the corners of the tote to simulate wear. There may be a slight gap at the seam between the sides and end. Don't worry; the gap's on the original, too.

6 Attach the bottom. The bottom is made of three boards nailed in place. Before you nail the boards in place, roundover what will be the exposed edges of the bottom. Put a ¼-inch-radius roundover bit in your router. Secure the router in a router table. Adjust the height of the bit and position the fence to rout the profile shown. Rout the appropriate edges. Nail the boards in place with a single nail at each end; allow a ⅛-inch gap between the boards. The gap isn't mere country sloppiness; it allows the bottom to expand and contract without pushing the sides apart.

SHOP TIP: End grain tends to splinter when routed. To prevent this, guide the cut with a square piece of plywood that measures at least 12 × 12 inches. Put one edge of the plywood against the board and an adjoining edge against the fence. Keep the end of the board against the fence as you rout. The plywood will support the edge of the board and keep it from splintering.

7 Apply finish. The original magazine rack has a painted interior and a varnished exterior. After sanding the whole piece, finish your rack however you desire.

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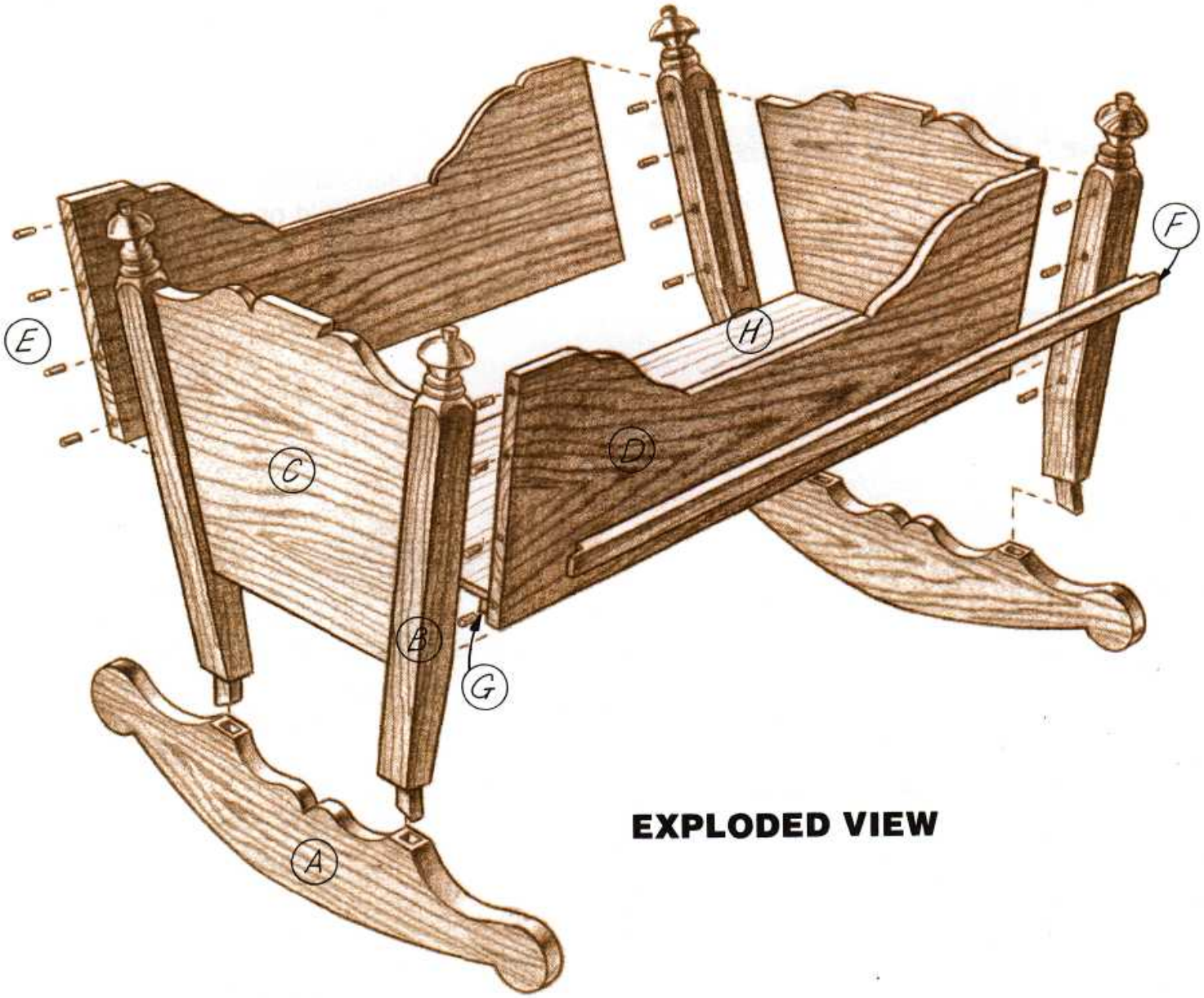
CRADLE



EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Rockers	2	1¼″ × 5¾″ × 28¼″	
B. Corner posts	4	1¾″ × 1¾″ × 24″	Cut to 22″ after turning.
C. End panels	2	⅞″ × 13⅜″ × 16⅝″	
D. Sides	2	⅞″ × 11⅝″ × 28⅛″	
E. Dowel stock	1	½″ dia. × 20″	Cut to fit.
F. Side strips	2	⅝″ × 1¼″ × 30¾″	
G. Floor support	2	7/16″ × ⅞″ × 28⅛″	
H. Floor boards	9	⅜″ × 3 3/16″ × 13⅝″	Cut to fit.

Hardware

As needed, #4 × ¾-in. flathead wood screws

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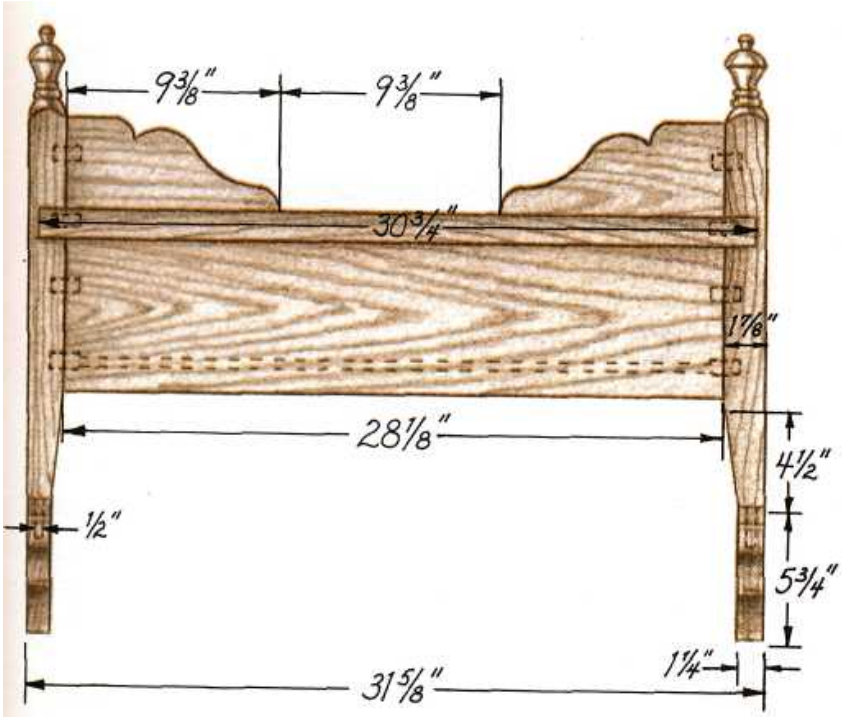
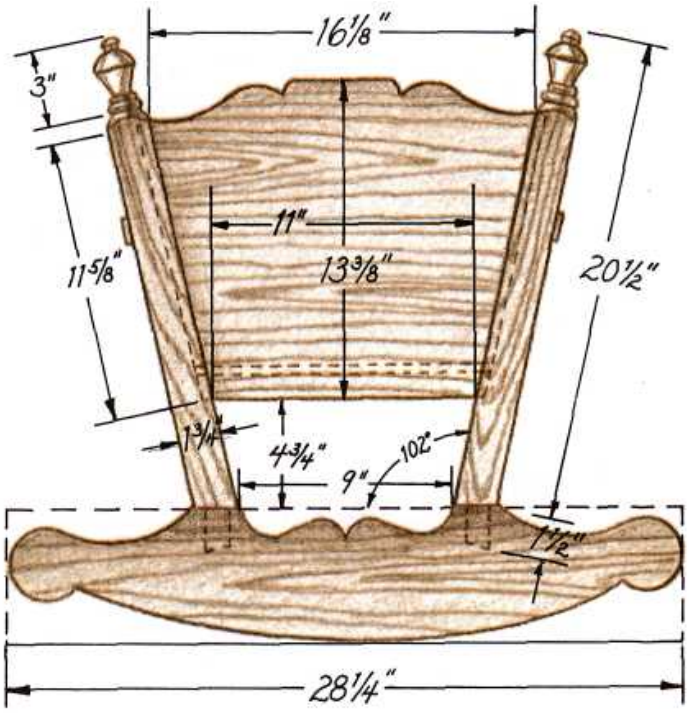


SIDE VIEW



END VIEW

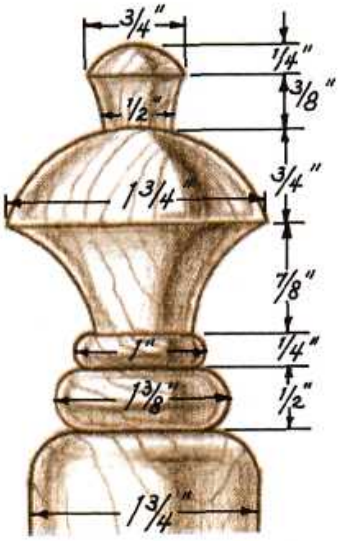
1 Select the stock and cut the parts. You can build this cradle out of pine, but an heirloom like this really deserves a hardwood like mahogany, walnut, or cherry. Choose straight, flat stock. Joint, plane, rip, and cut the parts to the sizes given in the Cutting List. If necessary, glue up stock to make the sides and end panels.

2 Drill the mortises in the rockers. Lay out the mortises on the rocker blanks as shown in the *End View* and *Side View.* Put a ½-inch drill bit in the drill press and set the depth stop to drill a hole 1½ inches deep. Drill a series of holes inside the layout lines. Then cut up to the layout lines with a sharp chisel.

3 Turn the knobs on the corner posts. Put a corner post in your lathe and turn the "knob" on its end to the dimensions shown in the *Corner Post Detail.* Remove the corner post from the lathe and trim off the waste. Turn the remaining posts, then crosscut the corner posts to the finished length.

If you don't have a lathe, you can either purchase knobs or finials separately and attach them, or make decorative top details with the table saw or band saw as shown in the *Alternate Table Saw/Band Saw Corner Post Detail.*

CORNER POST DETAIL



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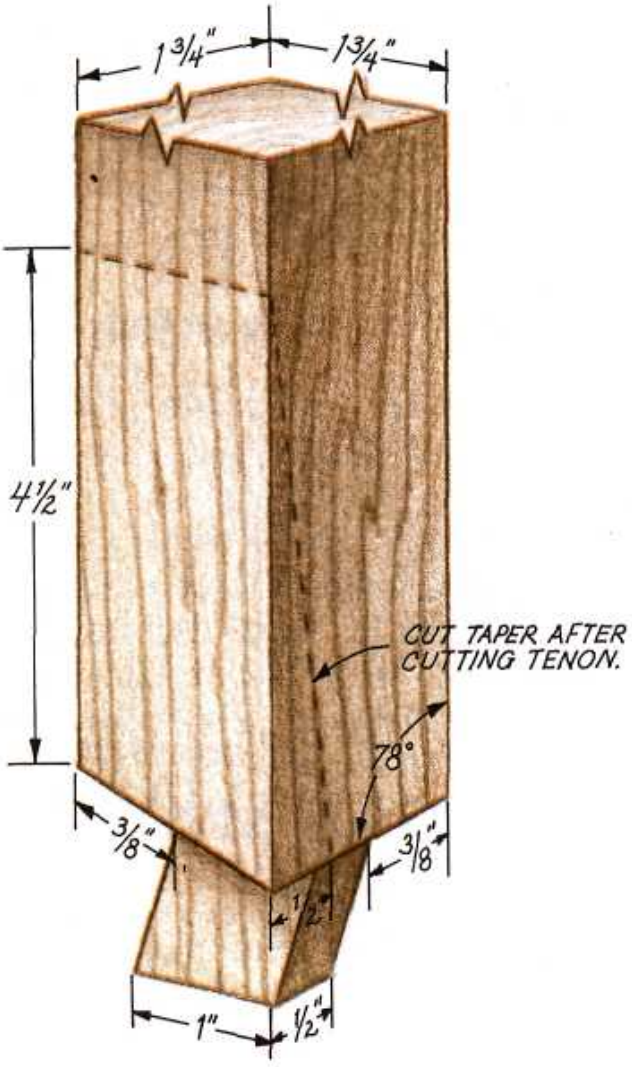
4 Cut the corner post tenons. The tenons at the bottom of the corner posts are angled as shown in the *End View.* Lay out tenons according to the dimensions shown in the *Tenon Detail.* Cut the tenons by hand with a dovetail saw or backsaw, constantly checking the tenons for proper fit in their mortises. For step-by-step directions on cutting angled tenons, refer to "Angled Tenons" on page 138.



TENON DETAIL

5 Rout grooves for the end panels. The end panels are housed in grooves in the corner posts. Put a 3/8-inch straight bit in your router. Secure the router in a router table and adjust the height to cut a groove 1/4 inch deep and adjust the fence to cut the groove down the middle of the corner post. Rout an 11 5/8-inch-long groove, beginning just below the finial. Square off the ends of the groove with a chisel.

6 Taper the corner posts. Lay out the taper shown in the *Side View* on the bottom of the corner posts. The taper begins 4 1/2 inches from the shoulder of the tenon. Cut the taper on the band saw, staying 1/16 inch to the waste side of the layout lines. Complete the taper on each post by sanding down to the layout lines.

7 Cut the end panels to size. Lay out the angle on the ends of the panels to the dimensions shown in the *End View.* Cut along the layout lines with a band saw or jigsaw.

Both ends of the panels are rabbeted on both sides, creating a tongue that fits in the corner post groove. Cut the rabbets on the table saw or router so that they leave a tongue 3/8 inch thick. If necessary, put a wooden auxiliary fence over the tool's fence to protect it from the cutter. Guide the cut along the auxiliary fence.

8 Cut the curves on the end panels, rockers, and sides. To cut the curves on the end panels, first draw a 1/2-inch grid on a piece of paper and draw the *End Panel Detail* onto it. Transfer the pattern to the stock. To ensure that the panel fits snugly in the groove, cut 1/16 inch wide of the layout lines. Shave the excess away with a round-bottom spokeshave or file until the panel fits in the groove. Smooth the rest of the curve with the spokeshave or file and sandpaper.

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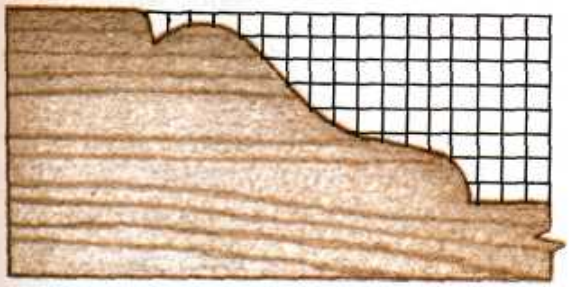
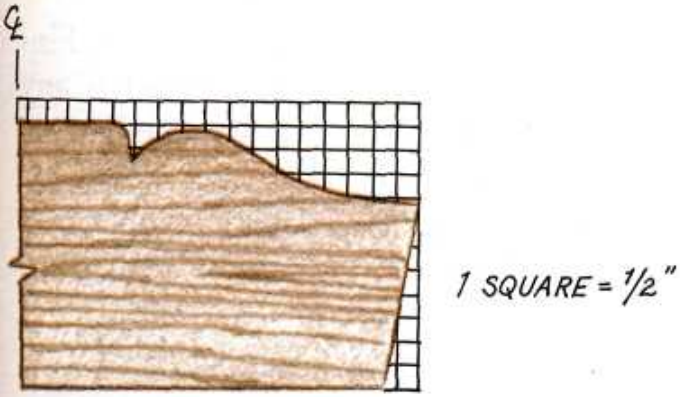
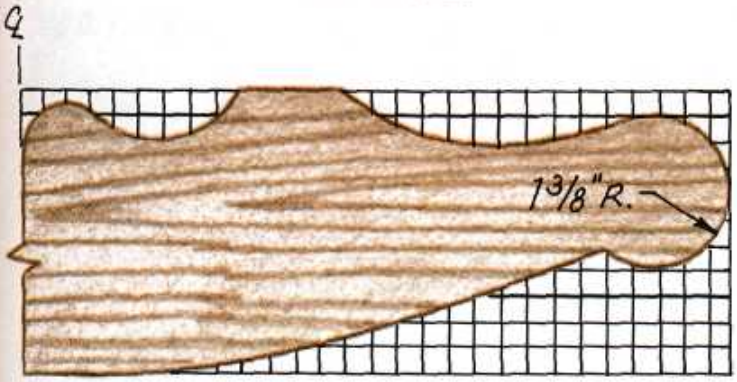


SIDE DETAIL



END PANEL DETAIL



ROCKER DETAIL

Lay out and cut the curves on the sides and rockers following the patterns shown in the *Side Detail* and *Rocker Detail.* Smooth the curves as before.

9 Assemble the cradle ends. Assemble the ends one at a time. Put glue in the corner post grooves and rocker mortises. Slip the panel in its grooves and the corner post tenons in the rocker mortises. Clamp the assembly together and allow it to dry.

SHOP TIP: Clamping nonparallel surfaces, like those of the corner posts, can be tricky. To provide parallel surfaces, cut 3-inch blocks from a scrap 2 × 4. Cut one long face of the wedge at 78 degrees to the short face. Put the wedges between the clamp heads and the corner posts when clamping to provide parallel surfaces.

10 Glue the sides to the end units. Lay out the dowel holes shown in the *Side View* along the center of the corner posts. The holes should be evenly spaced, but their exact locations aren't critical. Drill the holes. To transfer their locations to the cradle sides, put dowel centers in the holes and press the cradle lightly together. The points on the dowel centers will mark the cradle sides, showing you exactly where to drill the dowel holes. Drill the holes, then glue, dowel, and clamp the cradle sides to the assembled end units. After you've clamped the sides in place, measure diagonally from corner to corner to make sure the cradle is square. If one diagonal is longer, clamp gently across it until the diagonals are equal.

SHOP TIP: When you rock a rocking cradle or a rocking chair, it will scoot across the floor if it was twisted when it was assembled. To ensure that this cradle is assembled properly, glue the sides with the cradle upside down on a flat surface. The tops of the four corner posts should touch evenly to ensure a true assembly.

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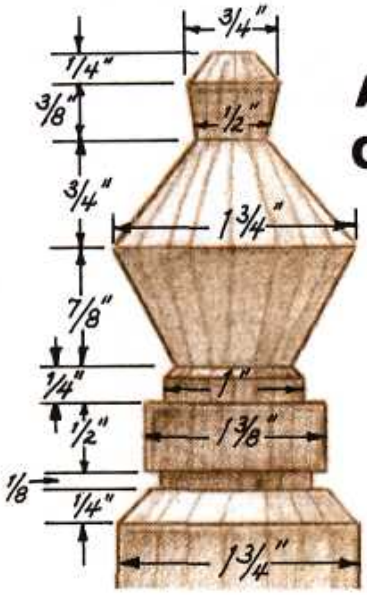
11 **Attach the side strips.** Set the side strips in place against the side of the cradle and mark the position of the corner posts. On the band saw, notch each end of the side strips to fit around the posts. Lightly clean up the rough-sawed surface with a chisel. Thin and slightly round-over the end of each side strip on the stationary belt sander, then glue and clamp them onto the sides of the cradle.

12 **Make the floor support strips.** Set the table saw blade to 12 degrees and rip this angle on one edge of each of the floor support strips. Lightly joint the strips, then glue and clamp them to the inside bottom edge of the cradle sides as shown in the *End View.*

13 **Cut the floorboards to fit into the cradle.** With the table saw blade set at 12 degrees, crosscut the ends of each floorboard so the board just fits within the sides. Cut notches in the appropriate floorboards to fit around the corner posts. Sand the floorboards and attach them to the floor supports with #4 × ¾-inch flathead wood screws.

14 **Sand and apply the finish.** Finish sand the cradle. Remove any excess glue and round the sharp edges as you sand. When choosing the finish for your cradle, make sure that you choose a nontoxic formula. Stain and varnish or paint the cradle, and add the baby.



ALTERNATIVE TABLE SAW/BAND SAW CORNER POST DETAIL

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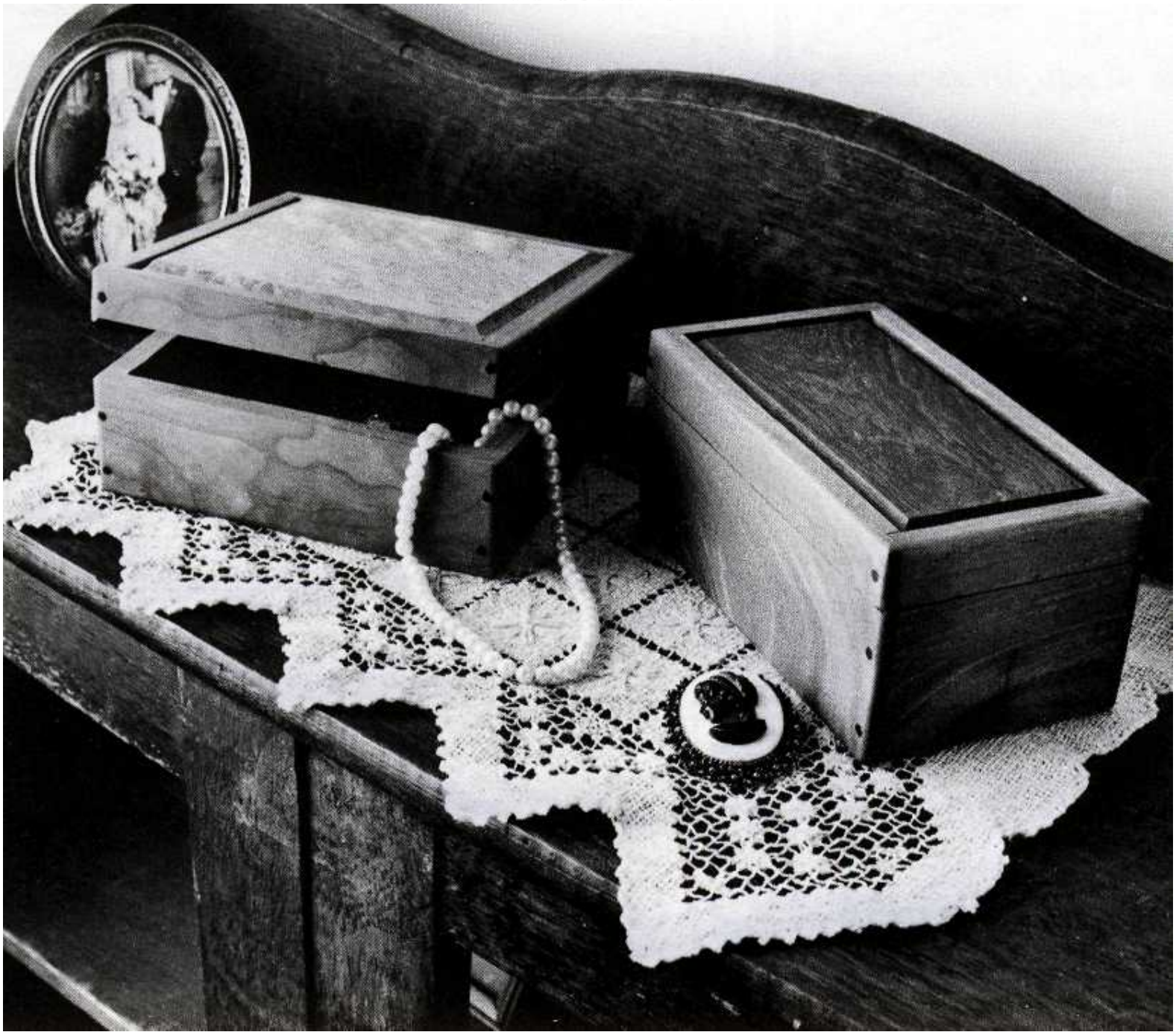
LITTLE BOXES



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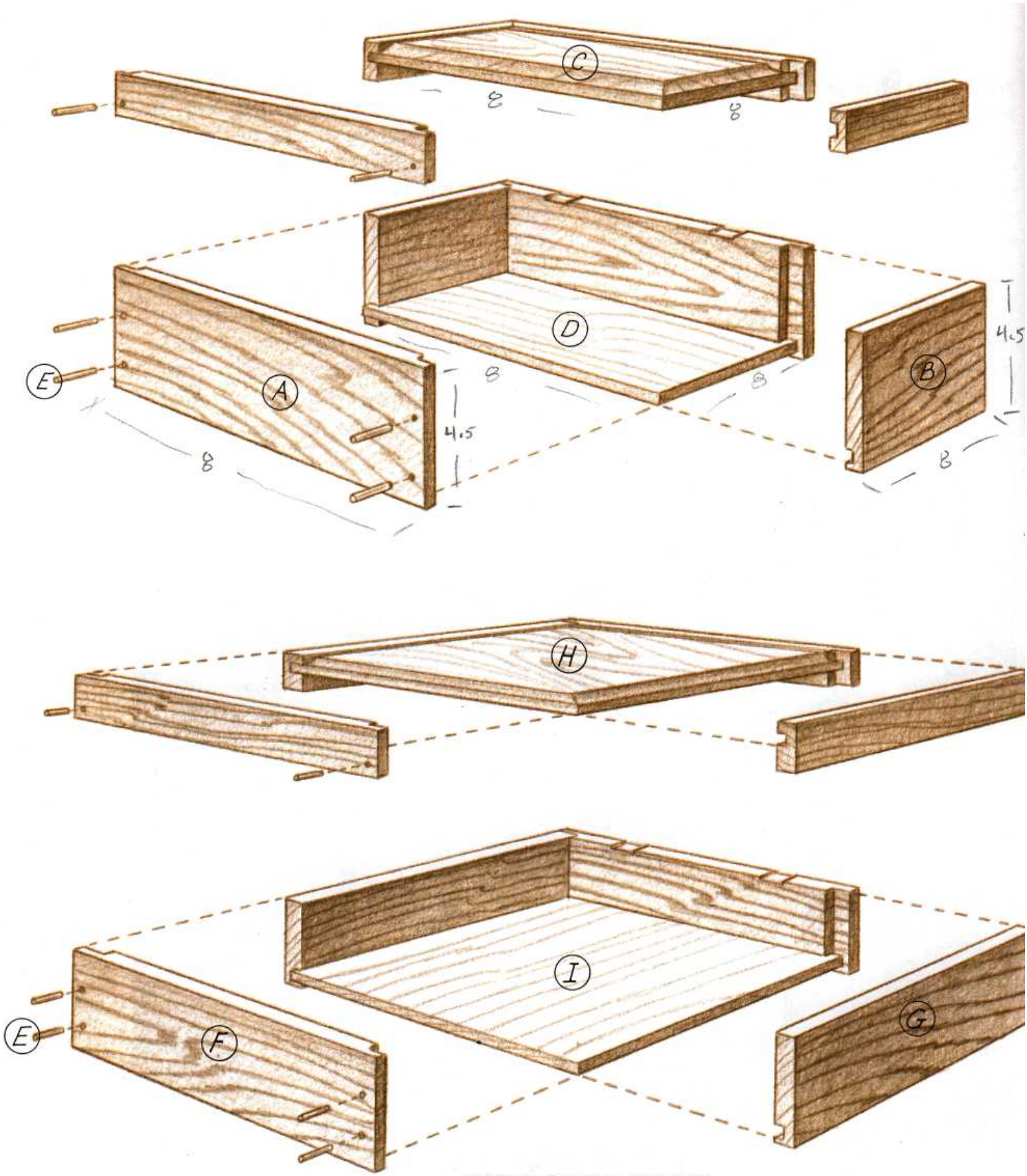

EXPLODED VIEW

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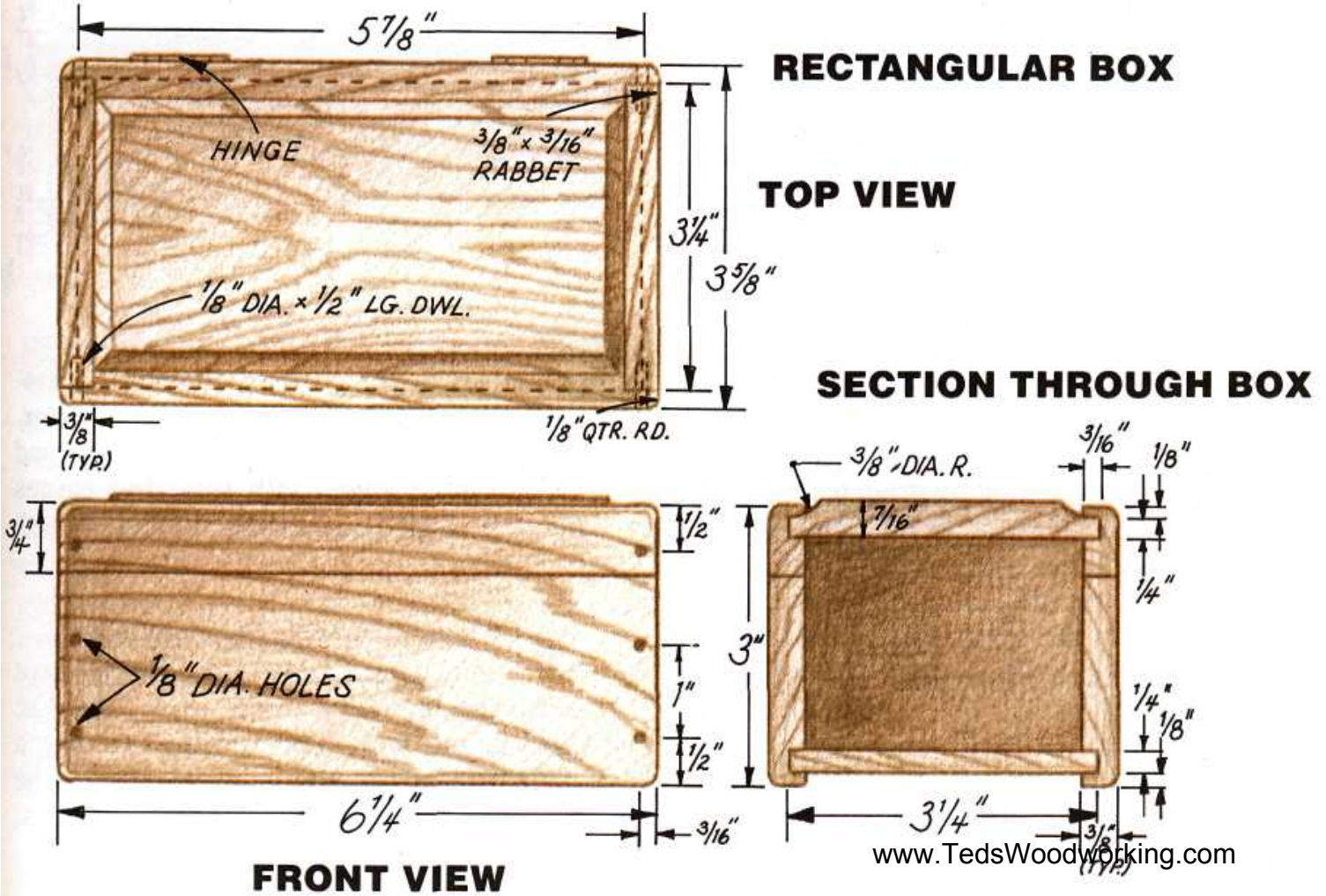
CUTTING LIST

Part	Quantity	Dimension	Comment
Rectangular Box			
A. Front/back	2	3/8" × 3 1/16" × 6 1/4"	Removing lid makes box 1/16" narrower.
B. Sides	2	3/8" × 3 1/16" × 3 1/4"	Removing lid makes box 1/16" narrower.
C. Top	1	7/16" × 3 1/4" × 5 7/8"	Trim to allow for expansion.
D. Bottom	1	1/4" × 3 1/4" × 5 7/8"	Trim to allow for expansion.
E. Pegs	12	1/8" dia. × 3/4"	
Square Box			
F. Front/back	2	3/8" × 2 9/16" × 6"	Removing lid makes box 1/16" narrower.
G. Sides	2	3/8" × 2 9/16" × 5 5/8"	Removing lid makes box 1/16" narrower.
H. Top	1	7/16" × 5 5/8" × 5 5/8"	Trim to allow for expansion.
I. Bottom	1	1/4" × 5 5/8" × 5 5/8"	Trim to allow for expansion.
E. Pegs	12	1/8" dia. × 3/4"	
Hardware			

2 13/16 × 1 3/16-in. hinges per box. Available from Meisel Hardware Specialties, P.O. Box 70, Mound, MN 55364. Part #1632.



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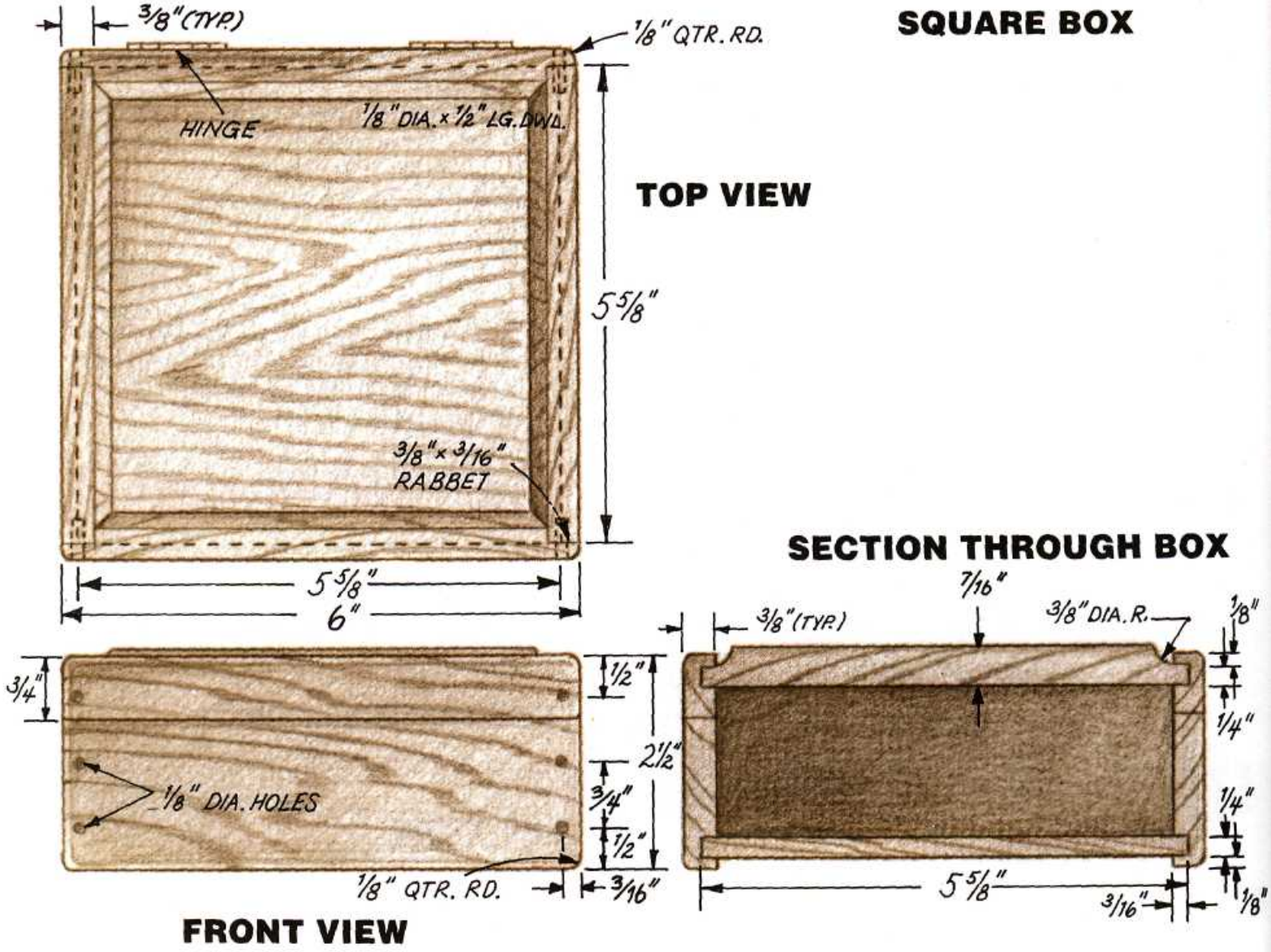

1 Select the stock and cut the parts. Look for straight, flat hardwood stock without knots. Try to find scraps with interesting grain patterns. Mix and match different wood types. Choose a tight-grained wood like walnut, maple, or rosewood for the pegs. Joint, plane, rip, and cut the parts, except for the pegs, to the sizes given in the Cutting List.

2 Cut grooves to receive the top and bottom. On your table saw, cut the grooves in the front, back, and sides as shown in the *Section through Rectangular Box* and *Section through Square Box*. Guide the stock against the fence and make the grooves with repeated passes over the blade, adjusting the fence with each cut.

3 Cut rabbets in the front and back. Cut the rabbets in the front and back as shown in the *Top View*. Cut the rabbets with repeated passes over a standard blade on the table saw. Guide the cuts with a miter gauge set at 90 degrees.

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4 Shape the top. To shape the raised-panel top put a 3/8-inch-radius cove bit in your router. Remove the bearing from the bit so that you can make a cut wider than normal. Secure the router in a router table. Cut a notch in a wooden fence that fits around the bit. Adjust the fence and bit height to cut the profile shown in the *Top View.*

SHOP TIP: When routing a profile around all four sides of the face of a piece of wood, rout the end grain first. Because of the nature of end grain, the wood tends to splinter at the corner when routing across the end of a board. You can't really avoid this splintering, but if you rout the end grain first, any splintering is cut away when you rout the sides.

5 Trim the top and bottom for expansion. When fitting a lid like this into a box, always leave room for the wood to expand. On the table saw, trim 1/32 inch from an edge parallel to the grain on the top and bottom panels to allow for this expansion.

6 Assemble the box. Test fit the sides, front, back, top, and bottom. Make sure that everything fits correctly and adjust as necessary.

When everything fits properly, lay the back on a flat surface and glue the sides into the rabbets. Then slide the top and bottom in place *without glue.* The bottom and top must be free to float in their grooves. Apply glue to the rabbets in the front of the box and put the front in place. Clamp the box together. Make sure that the sides are seated snugly in the rabbets.

Allow the glue to dry.

7 Drill and peg the rabbet joints. When the glue has dried, lay out and drill the 1/8-inch-diameter peg holes in the front and back as shown in the *Front View.*

With a block plane or spokeshave, shape the pegs to the size given in the Cutting List from 3/16-inch square stock. Tap the pegs into the peg holes and cut off any excess.

8 Round-over the edges and sand the box. Even up all the joints with sandpaper. Put a 1/8-inch roundover bit in the router. Secure the router in a router table and round all the edges of the box.

Finish sand the box.

9 Cut and hinge the top. To cut the lid from the rest of the box, set the box on edge on your band saw. Clamp a straightedge to the band saw to guide the cut, then cut slowly and carefully. Use push sticks to keep your hands away from the blade.

Sand away the kerf marks by rubbing the box lid and body over a piece of 180-grit sandpaper taped to a flat surface. Sand the cut edge as little as possible. Oversanding will produce an uneven fit.

The top is hinged to the body. The hinge is mortised between the back and top. With the hinge as your guide, mark and cut the hinge mortises. Cut the mortises by hand as explained in "Hinge Mortises" on page 7.

Mark and predrill holes for the hinge screws and attach the top to the back.

10 Finish the box. The boxes shown have an oil finish. If you have chosen a nice mix of hardwoods, you should show off the wood with an oil finish that brings out the grain and color.

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JEWELRY CABINET

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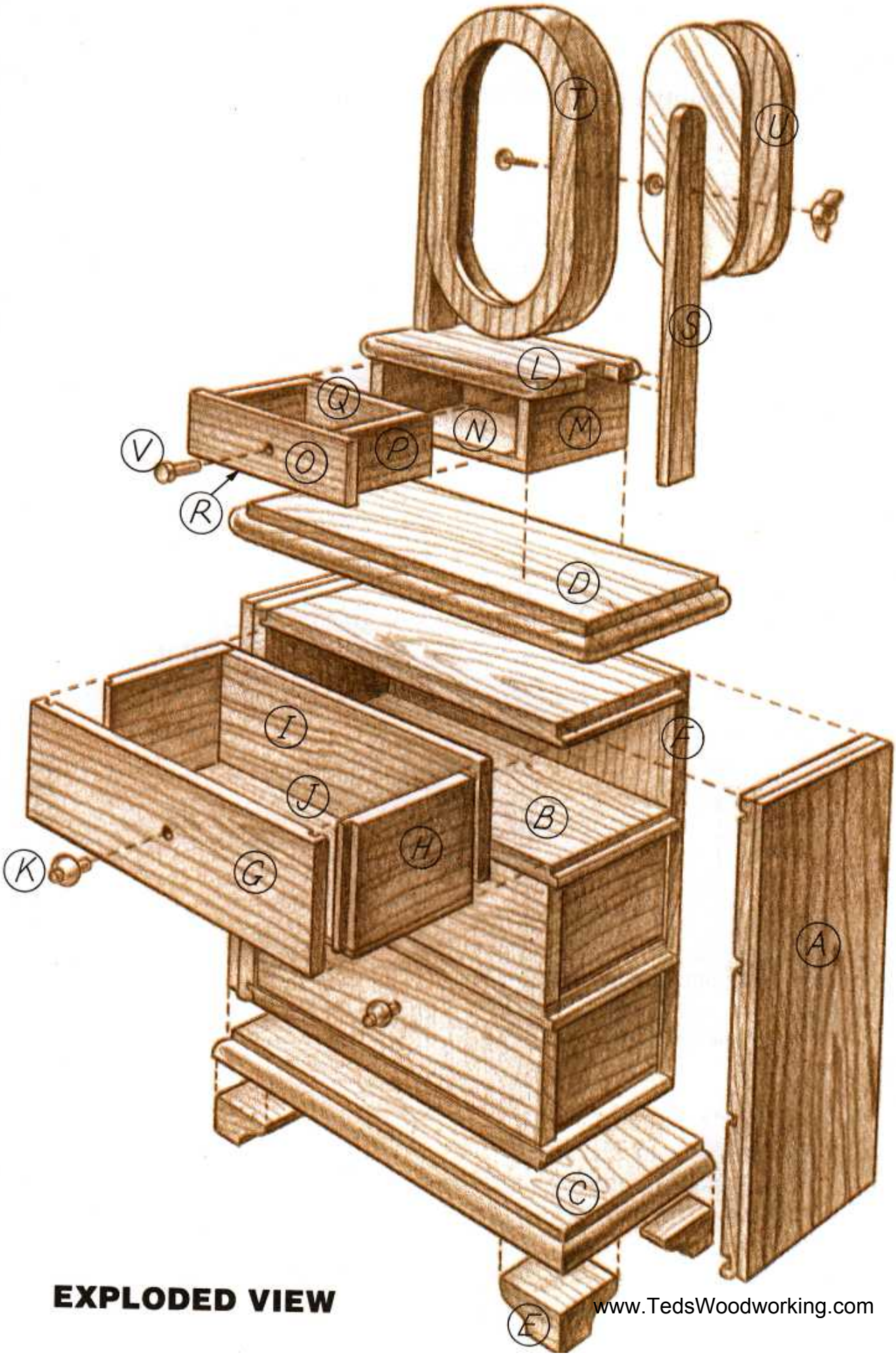

EXPLODED VIEW

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CUTTING LIST

Part	Quantity	Dimension	Comment
Lower Cabinet			
A. Cabinet sides	2	5/8" × 3 3/8" × 8 5/8"	
B. Drawer shelves	4	3/8" × 3" × 7 1/4"	
C. Cabinet bottom	1	13/16" × 3 1/2" × 8 5/8"	
D. Cabinet top	1	13/16" × 4" × 8 5/8"	
E. Foot stock	1	1 1/2" × 1 1/2" × 20"	Shape and cut to length.
F. Back	1	1/4" × 7 1/4" × 8 1/2"	Cut to fit.
G. Drawer faces	3	1/4" × 2 3/8" × 7 1/4"	Cut to fit.
H. Drawer sides	6	1/4" × 2 3/8" × 3"	Cut to fit.
I. Drawer backs	3	1/4" × 2 3/8" × 7 1/4"	Cut to fit.
J. Drawer bottoms	3	1/8" × 3" × 7 1/4"	Cut to fit.
K. Drawer knobs	3	5/8" × 5/8" × 3"	Cut after turning.
Upper Cabinet and Mirror			
L. Top	1	3/8" × 3 1/8" × 4 3/4"	
M. Sides	2	3/8" × 2 3/4" × 1 1/2"	
N. Bottom	1	1/4" × 2 3/4" × 3 1/4"	
O. Drawer face	1	1/4" × 1 3/4" × 4"	Cut to fit.
P. Drawer sides	2	1/4" × 1 1/4" × 3 1/8"	Cut to fit.
Q. Drawer back	1	1/4" × 1 1/4" × 3"	Cut to fit.
R. Drawer bottom	1	1/8" × 3" × 3"	Cut to fit.
S. Mirror supports	2	1/4" × 3/4" × 7 1/2"	
T. Mirror frame	1	1" × 3 7/8" × 7 1/4"	
U. Mirror back	1	1/4" × 3 7/8" × 7 1/4"	Cut to fit.
V. Drawer knob	1	5/8" × 5/8" × 3"	Cut after turning.

Hardware

As needed, 3/4-in. brads
2 1/8 × 2-in. bolts with wing nuts and washers
As needed, 1/2-in. brads
1 1/8 × 3 3/8 × 6 5/8-in. oval mirror glass
6 pushpins

1 Select the stock and cut the parts. Choose a close-grained wood such as cherry for this cabinet. The open grain of a wood such as oak would seem coarse in a project this size. One board should provide all the material you need.

Because this project requires thin pieces of stock, resaw thicker material on your band saw or table saw where necessary. Joint, plane, rip, and cut the parts to the sizes given in the Cutting List.

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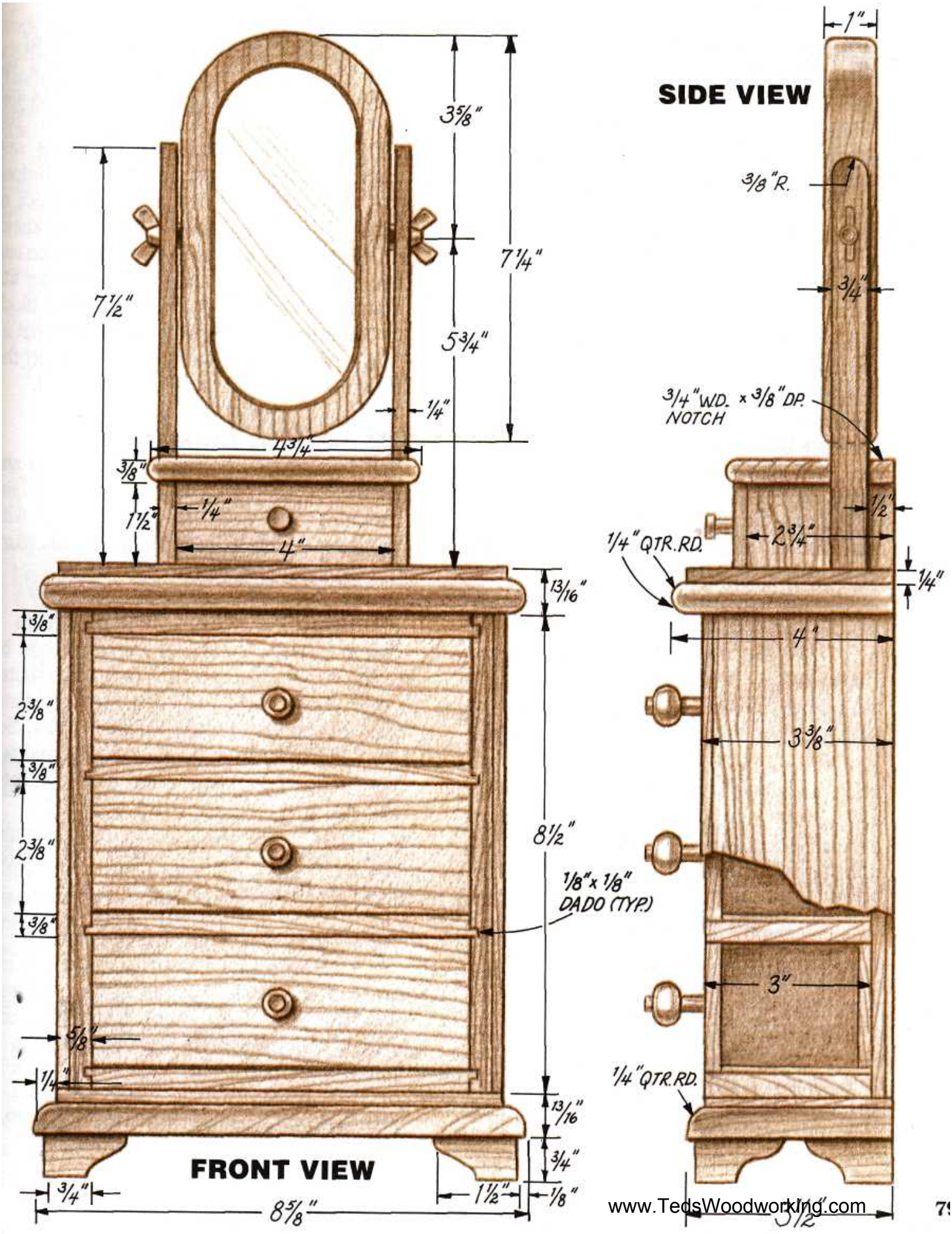

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2 Cut the shelf dadoes in the sides. The shelves fit into the sides with dado joints the width of the table saw blade. Adjust the height of the blade to cut a ⅛-inch-deep dado. Lay out the dado spacing on one of the sides.

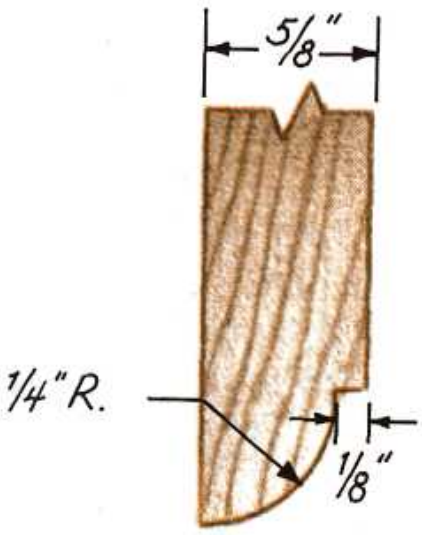
Screw a long wooden extension to your miter gauge. Position the cabinet side against the extension to cut one of the dadoes. Clamp a stop block to the fence at the end of the side farthest from the blade.

Cut the first dado. Put the other cabinet side against the stop block and cut a dado on the second side. The stop block ensures perfectly matching dadoes.

Cut all the dadoes in both sides.

3 Rout the front edge of the sides. This detail is easily made. Put a ¼-inch roundover bit in your router. Secure the router in a router table and adjust the height of the bit so there is a step with the roundover as shown in the *Edge Detail.* Set up a fence to guide the side as you rout. If you don't use a fence, the bit's bearing will fall into the dadoes.

EDGE DETAIL



4 Cut the tongue in the ends of the shelves. Each shelf has a ⅛-inch-long tongue on each end that fits into the dadoes cut in the cabinet sides. You can cut these tongues on the table saw with the miter gauge as a guide. Before you do, cut a sample tongue in a piece of scrap. The scrap should be the thickness of the actual shelves. Adjust the fence and the blade height, until the sample fits snugly in the dadoes. Clamp a stop block to the miter gauge fence to ensure that all tongues are the same length. Cut the tongues. Sand the shelves and sides.

5 Assemble the sides and shelves. On a flat surface, glue and clamp the shelves into the dadoes. Make sure the front of the shelves are flush with the front of the sides. Check to make sure the cabinet is square.

6 Rout the profile in the bottom and top. Put a ¼-inch roundover bit in the router. Secure the router in a router table. Raise the bit to cut a step the same size as the one on the cabinet sides. Set up a fence and guide the bottom and top against it as you cut. Rout the front and sides of each piece.

After you cut the stepped profile, lower the bit to round-over the bottom edge of the top.

7 Attach the top and bottom to the side and shelf assembly. Sand the top and bottom cabinet pieces. Position them as shown in the *Front View* and *Side View,* then glue and clamp them in place.

8 Shape and attach the feet. Because the feet are small, the Cutting List calls for extra-long stock so you can

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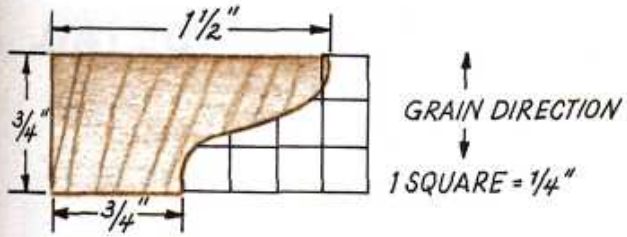
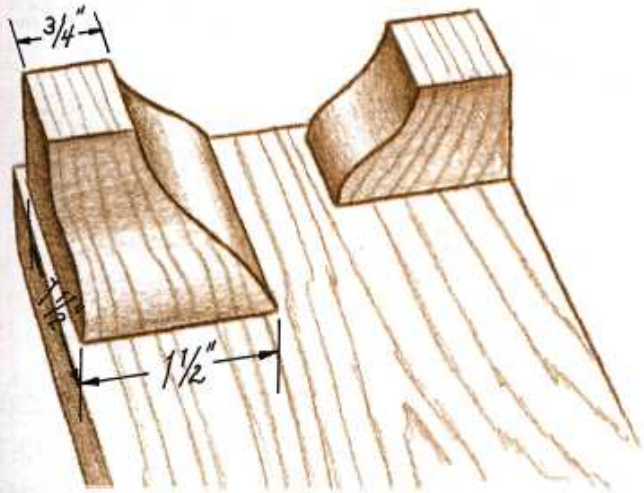
work safely. Cut the end of the stock on a band saw to the shape shown in the *Foot Detail.* Sand or file the cut smooth. Cut the foot to its finished length on the table saw.

Repeat the process with each foot. Then glue and clamp the feet in place to the cabinet bottom.



FOOT DETAIL



9 Attach the cabinet back. The cabinet back is attached to the cabinet with ½-inch brads. Measure the opening for the back and cut the back to fit. Predrill holes for the brads through the back pieces and into the shelves. Drill the holes with a bit that matches the size of your brads and then tap the brads in place.

SHOP TIP: Predrill brad holes by putting a brad in your drill instead of a regular drill bit. Drill the holes as you normally would for a hole the exact diameter of the brad.

10 Notch the upper cabinet top. Round-over the front and sides of the upper cabinet top to the profile shown with a 3/16-inch-radius roundover bit. Lay out the ⅜-inch-deep notch on each side of the top for the mirror support and cut the notches on a band saw.

11 Assemble the upper cabinet. Sand the top, sides, and bottom of the upper cabinet. Assemble the upper cabinet with glue and ¾-inch brads. First, set the sides against the bottom and drill brad holes through the sides into the bottom. Apply glue to the mating surfaces and tap the brads in place. Next, center the top over the sides, as shown in the *Front View* and *Side View,* and drill brad holes through the top and into the sides. Again, apply some glue and tap in the brads.

When the glue has dried, glue and clamp the upper cabinet in position on the top of the lower cabinet and clean up any excess glue.

12 Cut and assemble the drawers. Whenever you build a cabinet with drawers, it's a good idea to fit the drawer parts to the actual cabinet. The dimensions in the Cutting List yield parts about ¼ inch larger than needed. Measure the opening for the drawers and cut the parts to make drawers that are 1/16 inch smaller than the actual openings.

The upper drawer face overlaps the cabinet sides, while the lower drawers do not. Although this means the joints are spaced differently, construction of the joints is identical. The sides of the drawers are attached to the drawer fronts with small tongue-and-groove joints. Cut the joints on the table saw, the same way you cut the joints for the shelves.

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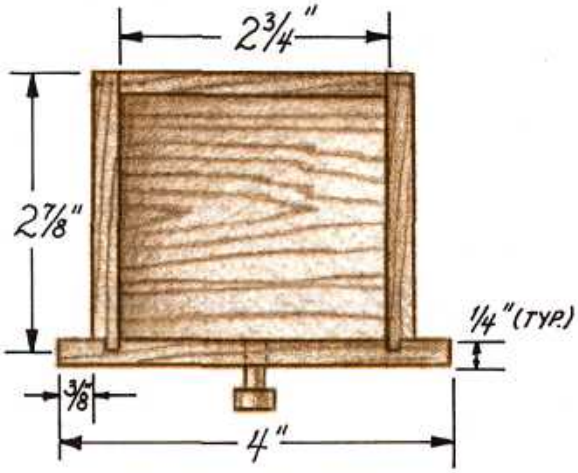
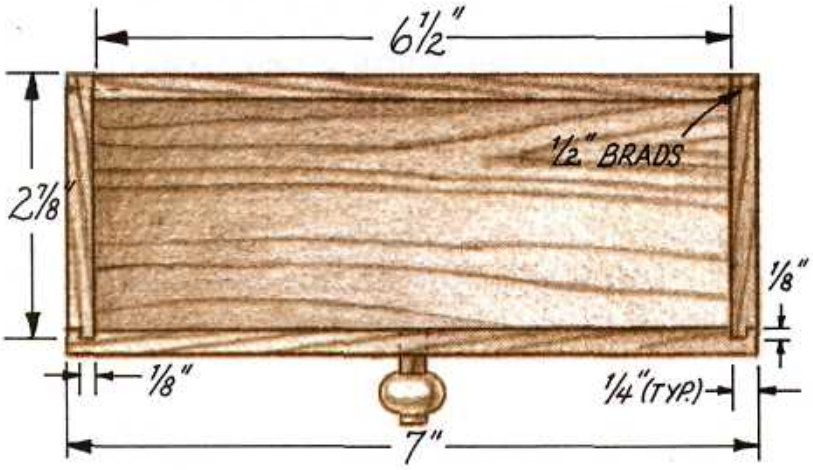
Sand all the drawer parts. Attach the sides to the back with glue and ½-inch brads as shown in the *Upper Cabinet Drawer, Top View* and *Lower Cabinet Drawer, Top View.* Predrill through the sides into the back for the brads, then glue and brad the sides to the back. Glue and clamp the side tongues into the dadoes in the drawer face. Glue and clamp the drawer bottom to the underside of each drawer. Keep each drawer flat and square.

UPPER CABINET DRAWER



TOP VIEW

LOWER CABINET DRAWER

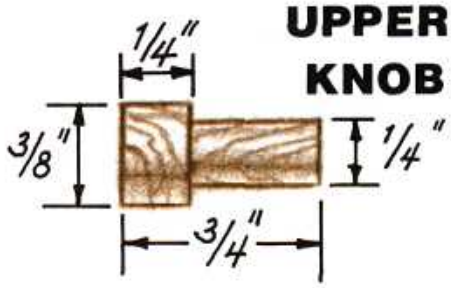


TOP VIEW

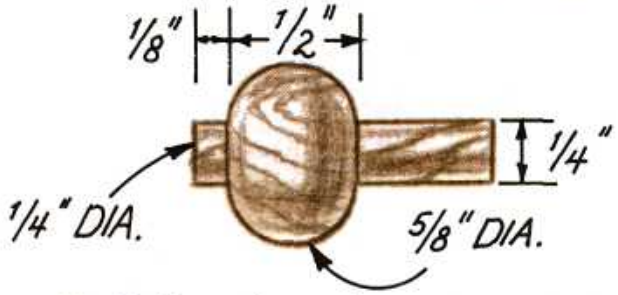
13 Turn or purchase the drawer knobs. Turn the knobs to the profile shown in the *Upper Drawer Knob Detail* and *Lower Drawer Knob Detail* or purchase similar knobs at a hardware store.

Drill a hole in each drawer face for the knob shaft and glue the knobs in place.

UPPER DRAWER KNOB DETAIL



LOWER DRAWER KNOB DETAIL



14 Cut the mirror supports to shape. Lay out the ⅜-inch-radius curve at the top of each mirror support. Cut the curve on the band saw and sand away the saw marks.

Lay out and drill holes for the bolts and wing nuts shown in the *Front View.* Sand the supports, then attach them to the upper cabinet sides with glue and ½-inch brads.

15 Make the mirror frame. First, draw a ¼-inch grid on a piece of paper and draw the *Mirror Frame Detail* onto it. Transfer the pattern to the stock, drill a ⅜-inch hole in the center section, and cut out the center shape with a jigsaw or scroll saw. Sand the sawed edge smooth.

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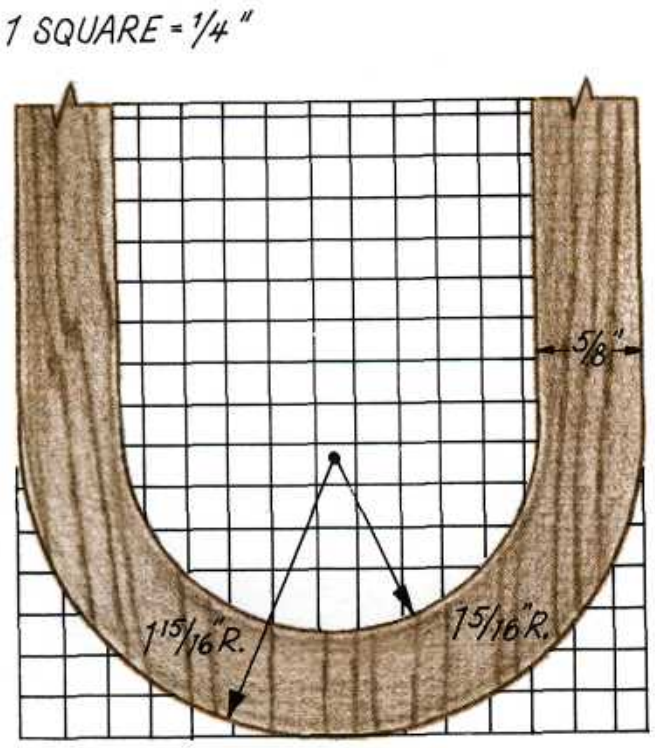
Put ¼-inch roundover bit in a router. Secure the router in a router table and adjust the bit to cut the profile shown in the *View through Mirror Frame.*

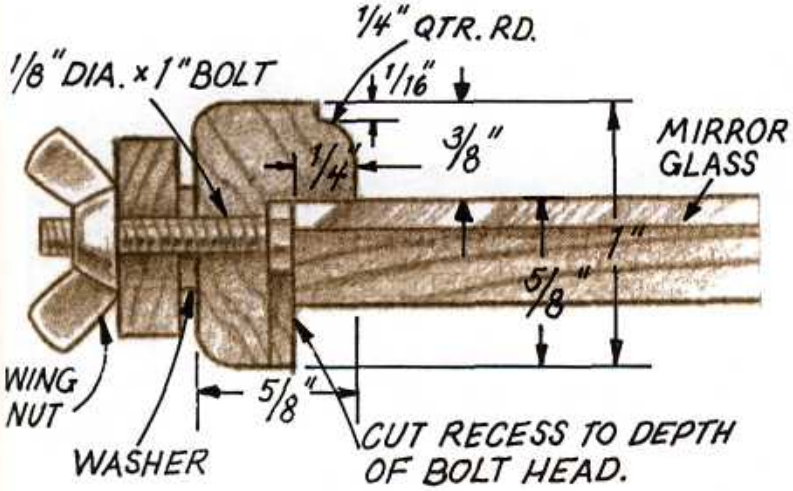
Next, rout a ¼ × ⅝-inch rabbet in the back of the mirror frame to accept the mirror glass and back. You can rout this rabbet with a normal ⅜-inch rabbeting bit, but you must first add a larger bearing. Replace the bearing on your ⅜-inch rabbeting bit so that you can cut a ¼-inch-wide rabbet. Cut the ⅝-inch-deep rabbet in two passes. Cut the back to fit in the rabbet.

After you've rabbeted for the back, cut the outside of the mirror frame to shape with a jigsaw or band saw and sand the sawed edge smooth. Round-over the outside edges of the mirror frame with a ¼-inch roundover bit.

MIRROR FRAME DETAIL



VIEW THROUGH MIRROR FRAME



16 Attach the mirror frame to the mirror supports. The mirror frame attaches to the mirror supports with ⅛-inch bolts and wing nuts. Drill ⅛-inch-diameter holes for the bolts centered in each side of the mirror frame as shown in the *Front View.*

Next, chisel out a recess in the mirror frame rabbet for the bolt head as shown in the *View through Mirror Frame.* Cut the recess deep enough so that the bolt head is flush with the surface of the wood.

Finally, put the mirror frame between the mirror supports and insert the bolts into their holes. Put small washers between the mirror frame and support and turn the wing nuts in place.

17 Apply the finish. Remove the mirror frame from its supports and finish sand the jewelry cabinet. The cabinet shown has an oil finish. Heavy varnishes could interfere with the movement of the little drawers. When the finish is dry, put the mirror frame back in its supports and install the mirror glass and back. Hold the mirror glass and back in place with push pins.

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DRESSING MIRROR

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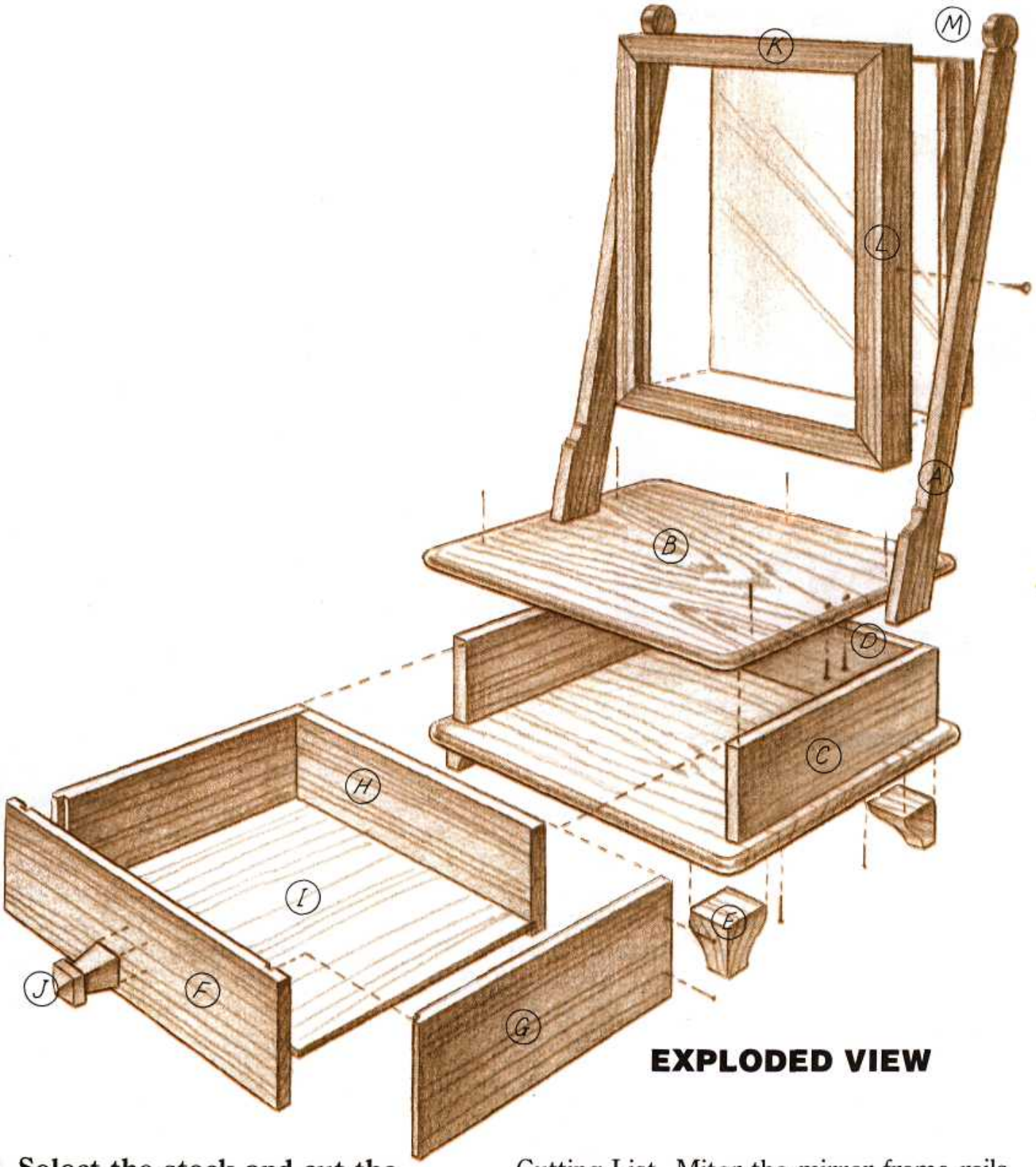

EXPLODED VIEW

1 Select the stock and cut the parts. The dressing mirror shown is made from pine, but a project this size could also be made inexpensively from a fine hardwood. Because people tend to get close to mirrors, they'll see any defects in the wood. Take extra care to select wood free of knots or defects. Joint, plane, rip, and cut the parts to the sizes given in the Cutting List. Miter the mirror frame rails and stiles as you cut them to length.

2 Cut the mirror supports to shape. Lay out the mirror supports, as shown in the *Mirror Support Detail.* Cut the bottom bevel on the table saw and cut the rest of the support on the band saw. Sand away any saw marks.

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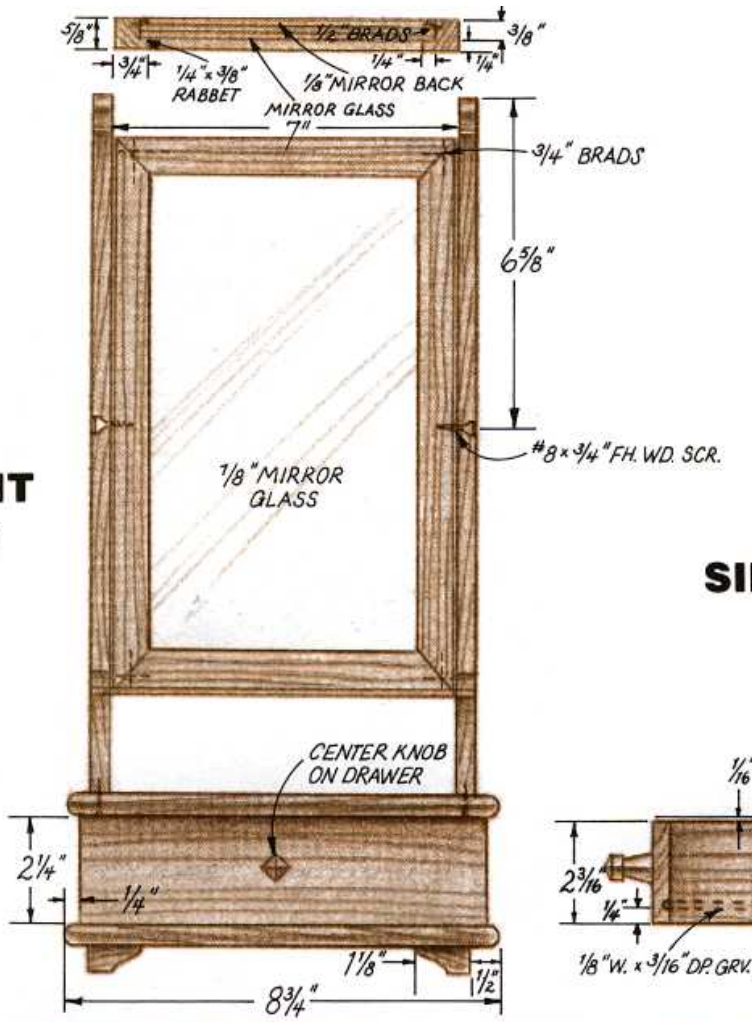

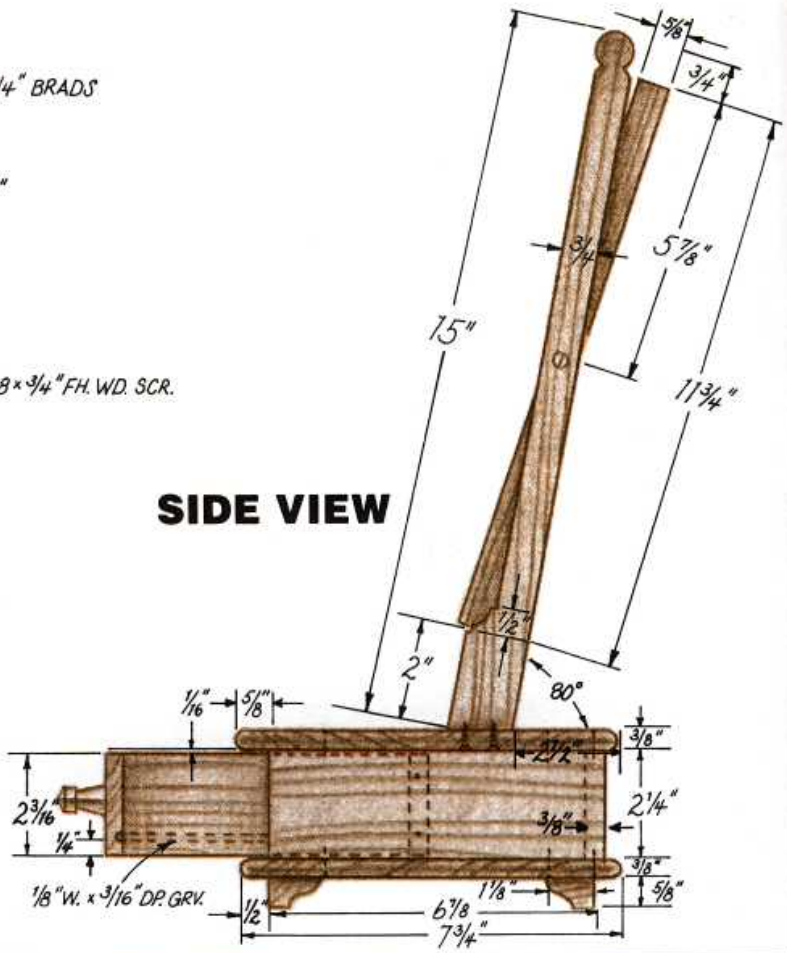

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Mirror support	2	3/8" × 1 1/4" × 15"	Bevel one end 80 degrees.
B. Top/bottom	2	3/8" × 7 3/4" × 8 3/4"	
C. Sides	2	3/8" × 2 1/4" × 6 7/8"	Miter to fit.
D. Back	1	3/8" × 2 1/4" × 8 1/4"	Miter to fit.
E. Feet	1	1 1/8" × 1 1/8" × 8"	Makes 4
F. Drawer face	1	3/8" × 2 3/16" × 8 1/4"	
G. Drawer sides	2	3/8" × 2 3/16" × 6 3/8"	
H. Drawer back	1	3/8" × 2 3/16" × 7"	Cut to fit.
I. Drawer bottom	1	1/8" × 6 3/16" × 7 1/16"	Plywood or Masonite
J. Drawer knob	1	9/16" × 9/16" × 6"	Cut to length after shaping.
K. Mirror rails	2	5/8" × 3/4" × 7"	Miter to fit.
L. Mirror stiles	2	5/8" × 3/4" × 11 3/4"	Miter to fit.
M. Mirror back	1	1/8" × 6" × 10 3/4"	

Hardware

1 1/8 × 6 × 10 3/4-in. mirror glass
1 #8 × 1-in. brass flathead wood screw
4 #6 × 1-in. brass flathead wood screws
2 #8 × 3/4-in. brass flathead wood screws
As needed, 3/4-in. brads
10 1/2-in. brads

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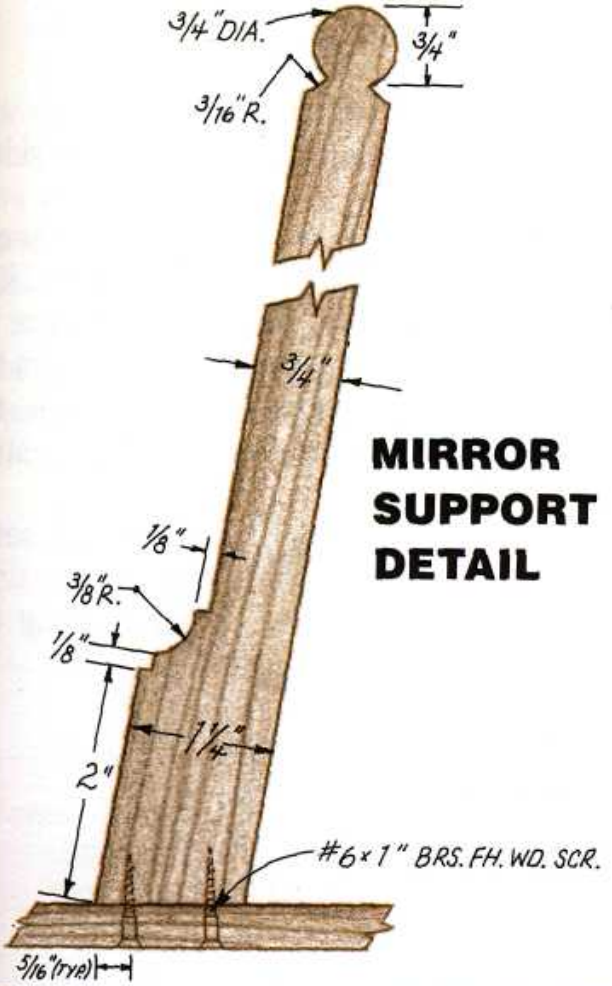


MIRROR SUPPORT DETAIL

3 Round-over the edges of the top and bottom. Put a 3/16-inch round-over bit in your router. Secure the router in a router table and adjust it to rout the top and bottom to the profile shown in the *Front View.* Set up a fence on the router table and guide the top and bottom against it as you rout.

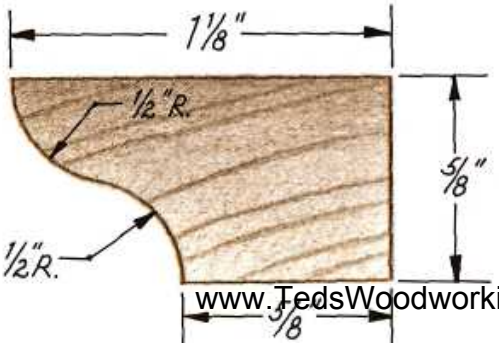
4 Lay out and drill the screw holes for the mirror support. Lay out holes for the screws that attach the mirror support to the top. Drill the 1/8-inch clearance holes perpendicular to the top, as shown in the *Mirror Support Detail.* Put the mirror supports in place on the top and push an awl up through the screw holes to mark the location of the screw holes on the bottom of the supports. Drill 3/32-inch-diameter pilot holes for the #6 × 1-inch brass flathead wood screws at the marks left by the awl and screw the supports to the top.

5 Miter the sides and back. Miter the back edge of the sides and both ends of the back. Put glue on the miters and clamp them together with corner clamps. When the glue is dry, reinforce the miters with 1/2-inch brads.

SHOP TIP: To get accurate miters, check your setup on some pieces of scrap. Set the table saw blade to the 45-degree position. Set the miter gauge to 90 degrees and use it to cut miters in two pieces of scrap wood. Put the miters together and make sure that the resulting angle equals 90 degrees. Adjust the blade as necessary.

6 Glue the top and bottom to the sides and back. Attach the top and bottom to the sides with glue and 3/4-inch brads. Make sure that the top overhangs the sides and back by 1/4 inch and that it overhangs the front of the sides by 5/8 inch, as shown in the *Side View.*

7 Shape the feet. Because the feet are small, it's best to cut them on an oversize piece of stock and then cut the stock to length. Begin with a piece the size given in the Cutting List. On the band saw, cut the profile shown in the *Foot Detail* on one side of the stock. Rotate the stock and cut the profile on an adjoining face. Sand or file the saw cut smooth and then cut the feet to their finished lengths.



FOOT DETAIL

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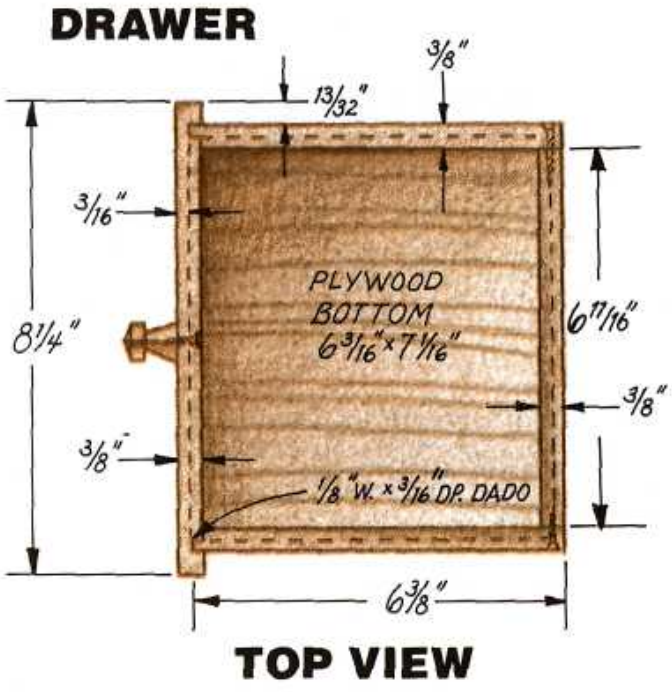
8 Cut the drawer joints. The drawer sides have tongues that fit into dadoes in the drawer face. Measure the front of the cabinet from edge to edge and cut the drawer face to this length. Lay out the dadoes on the drawer face, as shown in the *Drawer, Top View.* The distance between the outside of the dadoes should be 1/16 inch less than the opening for the drawer.

Both the dadoes and the tongues can be cut on a table saw with the normal blade—the dado is a single saw kerf wide. Adjust the height of the blade to cut a 1/8-inch-deep dado. Guide the stock with a miter gauge as you cut the dadoes.

Lay out the 1/8-inch-long tongue on the front end of the sides, as shown in the *Drawer, Top View.*

Before you cut the joint, cut a few samples on a piece of scrap the exact thickness as the drawer side. Lay the scrap flat on the table saw and guide it over the blade with the miter gauge. Adjust the blade height so the tongue fits snugly in the dadoes in the drawer face. Cut the tongues on the drawer sides.

Cut the back to fit between the sides.



9 Rout the groove for the drawer bottom. Put a 1/8-inch straight bit in your router. Adjust the router's fence attachment to cut a groove 1/4 inch from the drawer face's bottom edge. Rout the groove, beginning at one dado and stopping at the other.

Rout a groove with the same setup 1/4 inch from the bottom edges of the sides and back. Rout these grooves along the entire piece.

SHOP TIP: Small pieces can be difficult to clamp in place while routing. Hold them to the bench with doubled-sided tape or buy a commercially available foam rubber mat designed to hold pieces while routing.

10 Drill for the drawer knob hole. Measure and mark the drawer face for the drawer knob screw. Drill and countersink a 1/8-inch hole for the screw.

11 Assemble the drawer. Glue the tongues on the drawer sides into the dadoes in the drawer face. Trim the plywood bottom to fit, if necessary, and slide it in place. Attach the sides to the back with glue and 1/2-inch brads. Clamp the drawer face tightly against the sides and check to make sure the drawer is square.

12 Shape the drawer knob. The knob, like the feet, should be cut on a piece of long stock and then cut to length. Begin with a piece the size given in the Cutting List. On the band saw, cut

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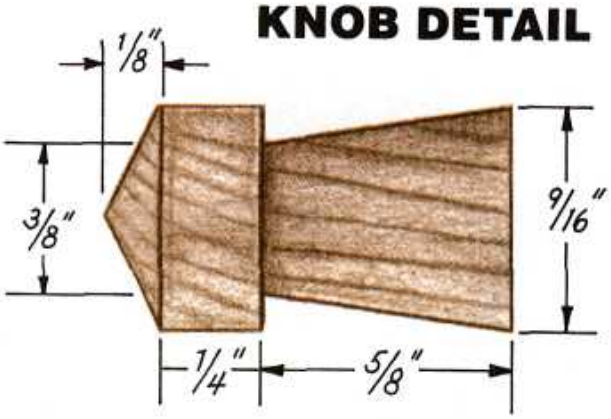
the profile shown in the *Knob Detail* on one side of the stock. Rotate the stock and cut the profile on an adjoining face. Sand or file the saw cut smooth and then cut the knob to its finished length.

Drill a hole for the screw in the knob and use a #8 × 1-inch brass flathead wood screw to secure the knob to the drawer face.

KNOB DETAIL



13 Rabbet and assemble the mirror frame. To rabbet the parts of the mirror frame to the profile shown, put a ¼-inch rabbeting bit in a router. Secure the router in a router table and use a fence while cutting the rabbets.

Put glue on all the miters and clamp the mirror frame together with corner clamps. When the glue dries, reinforce the mitered corners with ¾-inch brads, as shown in the *Front View.* If your dressing mirror is made from hardwood, predrill holes for the brads before you drive them in place.

14 Attach the mirror frame to the supports. Lay out and drill a pilot hole in each side of the mirror frame for the #8 × ¾-inch supporting screws. Screw the mirror frame to the mirror supports.

15 Apply the finish. Remove the mirror frame from the supports and finish sand all of the parts. Stain and varnish or paint the dressing mirror to match your decor. Don't apply a thick finish to the drawer sides and the box interior, because the drawer may bind.

When the finish is dry, install the mirror glass and back, and hold them in place with ½-inch brads. Reattach the mirror frame to the supports.

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CASSETTE BOX

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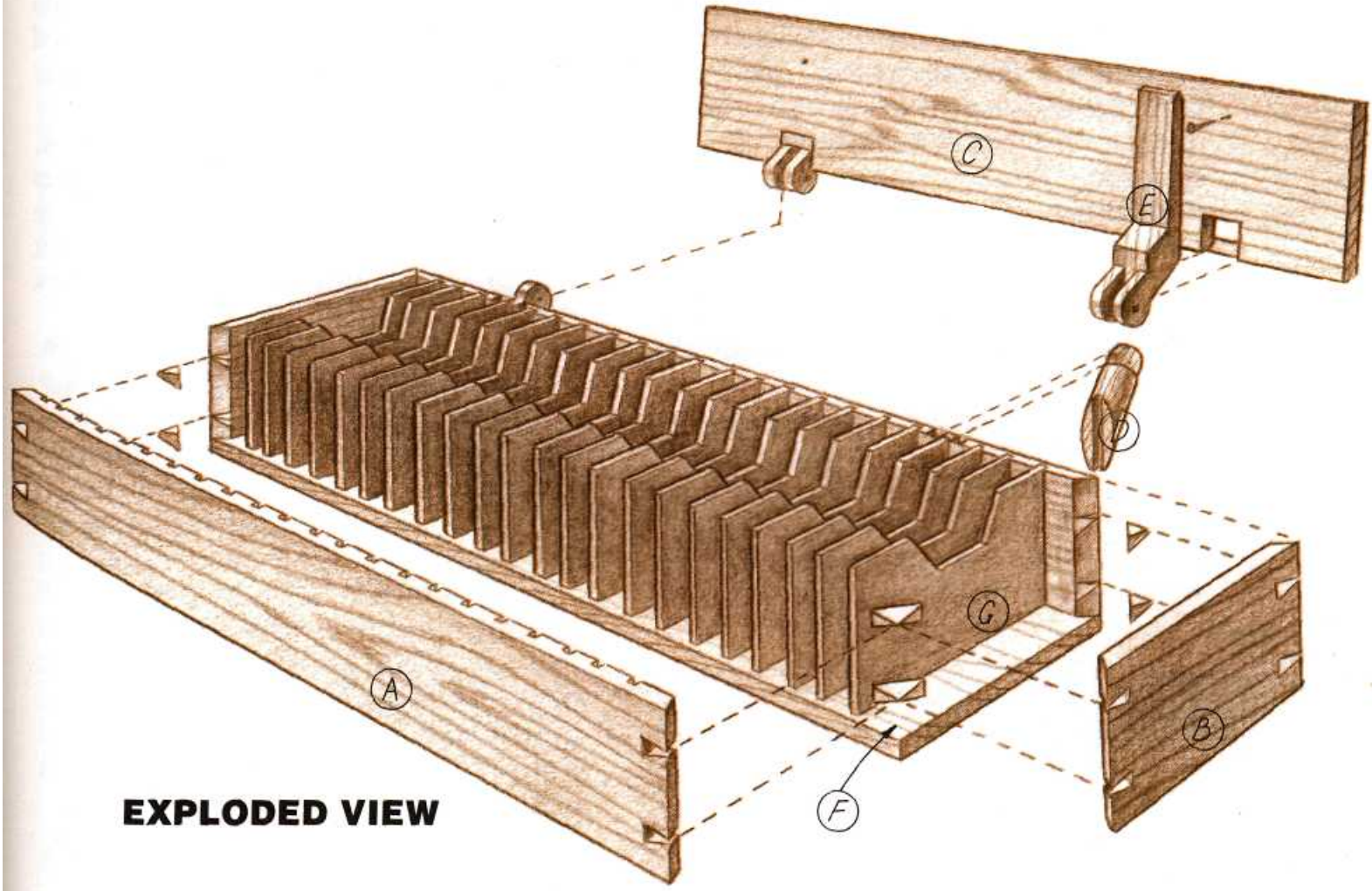

EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Front/back	2	⅜" × 3" × 21¾"	Miter to 20¾".
B. Sides	2	⅜" × 3" × 6¼"	Miter to 5¼".
C. Top/bottom	2	⅜" × 5¼" × 20¾"	
D. Hinge dowels	2	⅝" dia. × 2½"	
E. Hinge leaves	2	¾" × 1¼" × 6"	Shape to length.
F. Insert stock	1	½" × ½" × 15"	Makes 8
G. Dividers	21	⅛" × 3" × 4¾"	

Hardware

As needed, 1-in. brads
2 #5 × ½-in. flathead wood screws
1 1⁄16-in. dia. brass braising rod

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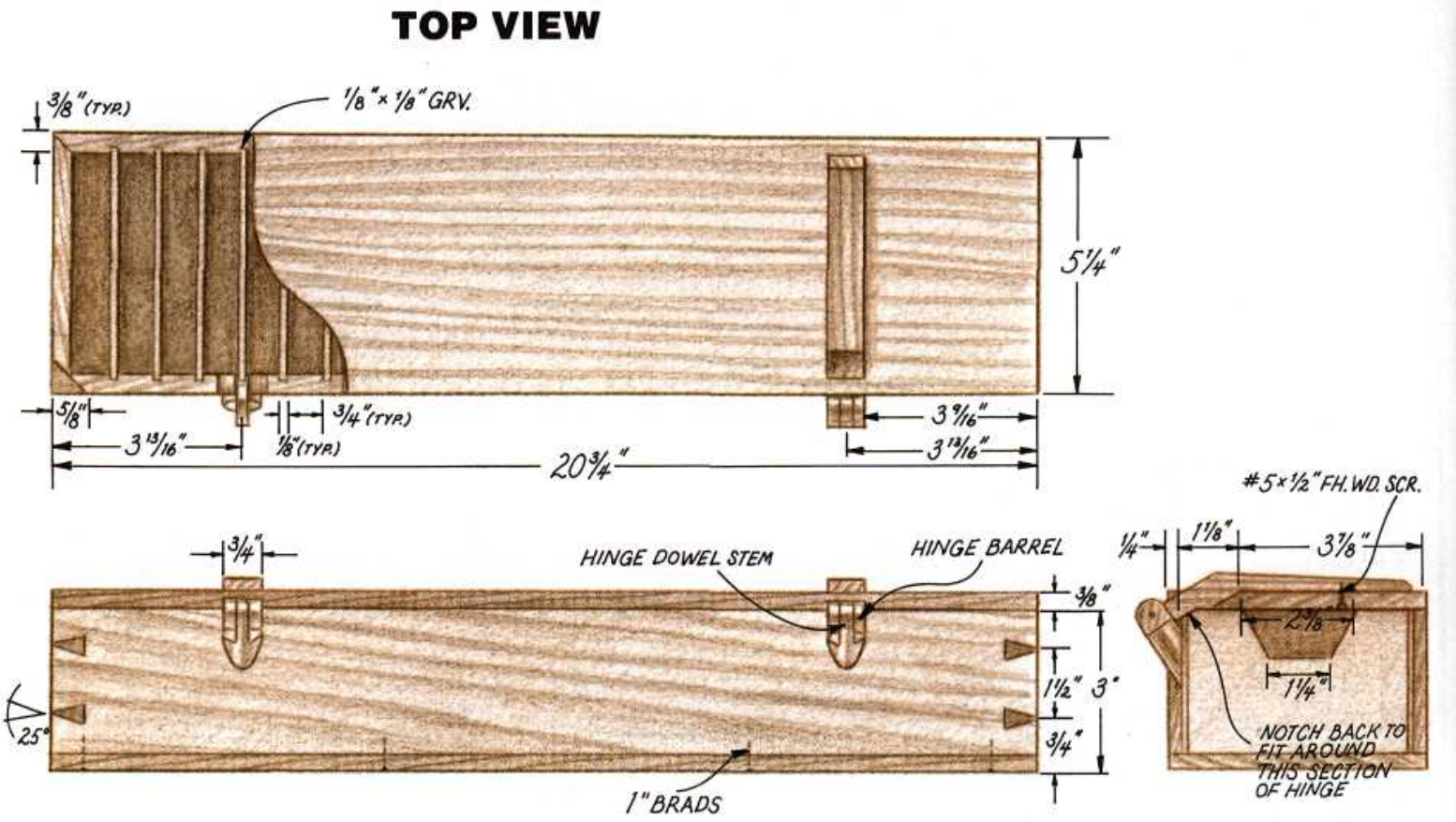
1 Select the stock and cut the parts. The cassette box shown has a poplar body, cedar top and bottom, and purpleheart dovetail inserts. For your box, mix and match woods that complement each other and highlight the construction. Choose straight, flat stock. Joint, plane, rip, and cut the parts to the sizes given in the Cutting List.

2 Miter the front, back, and sides. Set your table saw blade to 45 degrees. Set your table saw miter gauge to 90 degrees and guide the miter cuts with it. Because the sides are short, you'll need to screw an extension fence to the miter gauge.

Miter one end each of the front, back, and sides. When these miters have been cut, clamp a stop block to the miter gauge extension fence. Position the stop block so that when you cut the second miters the parts will also be cut to length.



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SHOP TIP: To get accurate miters, check your setup on some pieces of scrap. Set the table saw blade to 45 degrees. Set the miter gauge to 90 degrees and use it to cut miters in two pieces of scrap wood. Put the miters together and make sure that the resulting angle equals 90 degrees. Adjust the blade as necessary.

3 Drill the hinge-dowel holes. Lay out the location of hinge dowel on the back of the box. Put a 5/8-inch drill bit in your drill press and adjust the table to drill the 30-degree holes in the back. Sandwich the back between two pieces of scrap to prevent the back from splintering as the drill enters and exits. Clamp a fence to the drill press table to support the back and adjust it so that when drilling, the edge of the hole just meets the top edge of the back as shown in the *Cross Section through Box.*

4 Cut the divider grooves. Stack the front and back together with inside surfaces touching. Make sure that the ends are even and secure with clamps. Lay out for the dividers across the top edges of the front and back. Remove the clamps.

Cut 1/8 × 1/8-inch grooves to hold the dividers. Most table saw blades cut a 1/8-inch kerf. Guide the cuts with a miter gauge at set 90 degrees.

5 Assemble the sides to the front and back. When the grooves have been cut, spread glue on the mitered ends of the front, back, and sides. Clamp them together with corner clamps and make sure the box is square. Allow glue to dry.

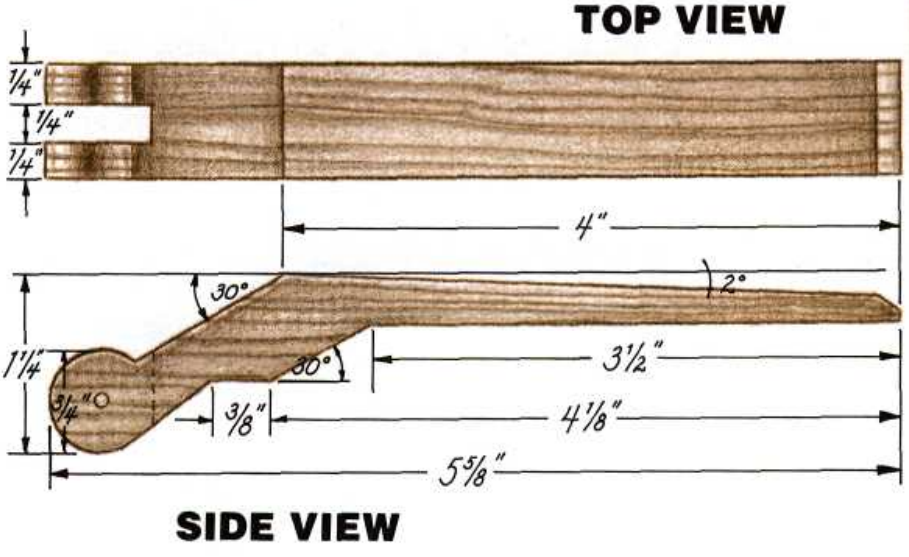
6 Attach the bottom. Glue the bottom to the underside of the front, back, and side assembly. Secure with 1-inch brads. When the glue has dried, plane or sand the edges of the bottom even with the front, back, and sides.

7 Glue the hinge dowels in place. The hinges are made from two pieces: a dowel mounted in the back of the box and a hinge leaf, which slips through a hole in the box lid.

Mount the hinge dowels before cutting them to the profile shown. To mount the dowels, spread glue in the hinge-dowel holes and slide the dowels in place. Slide each dowel in until its base is completely through the hole. When the glue has dried, saw and sand the dowel flush with the inside of the box.

8 Cut the hinge leaves to shape. Carefully lay out the hinge leaves, as shown in the *Hinge Leaf Detail,* on the hinge leaf stock. With a band saw, cut the wood to the shape shown. Cut the slot in the hinge barrel as shown.

HINGE LEAF DETAIL



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9 Attach the hinge leaves to the top. The hinge leaves fit through a slot in the lid. Lay out the slot, as shown in the *Cross Section through Box*. Use a ¼-inch drill bit to drill a hole through the lid that follows the angle of the slot.

Next, slip your coping saw blade through the hole and carefully cut the slot. Try to approximate the angle of the front and back of the slot as you cut.

Finally, test fit the hinge leaves and trim the slot as necessary with a sharp chisel. Screw the hinge leaves to the top with #5 × ½-inch screws as shown.

10 Complete the hinge assembly. With a backsaw or dovetail saw, cut stems on the hinge dowels that fit in the hinge barrel. As you cut the stems, you must also cut small notches in the box on either side of the stems. These notches, shown in the *Cross Section through Box*, provide clearance for the hinge barrel. Without the notches, the lid will not close.

When the top sits flat on the box, cut the hinge-dowel stem flush with the top edge of the hinge leaves. Round the corners of the stems with sandpaper.

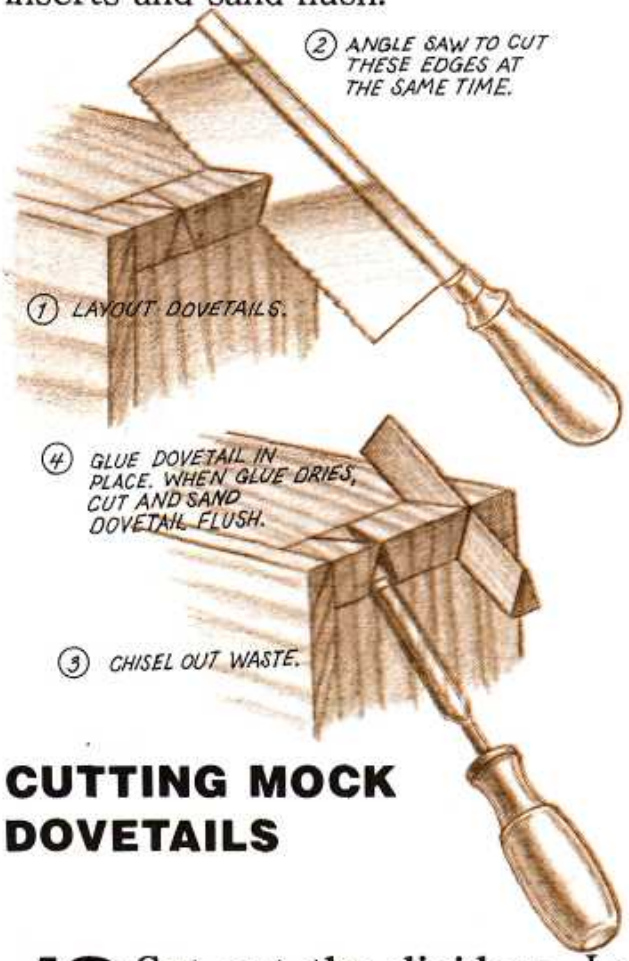
Make hinge pins from 1/16-inch brass braising rod. With the lid in place, use a 1/16-inch drill bit to drill through the hinge barrel and dowel. Remove the top and redrill the hole in the hinge dowel with a 3/32-inch drill bit to provide clearance. Put the top back in place and tap the hinge pins into their holes. Cut the hinge pins even with the hinge leaf sides.

11 Cut the mock dovetails. Scribe lines ⅝ inch from each corner. Lay out the dovetails, as shown in the *Back View*. Cut and chisel them out, as shown in *Cutting Mock Dovetails*.

Cut the dovetail inserts on the table saw. Set the blade to approximately 30 degrees. Guide some scrap stock against the fence to make a number of sample inserts, adjusting the blade angle until one of the samples fits the cutout. Cut the inserts with that same setup.

Glue the dovetail inserts in place and allow to dry.

When the glue has dried, trim the inserts and sand flush.



CUTTING MOCK DOVETAILS

12 Cut out the dividers. Lay out the notch shown in the *Cross Section through Box*. Cut out the notch on the band saw and sand the sawed edges smooth.

13 Apply finish. Finish sand the assembled cassette box. The cassette box shown has an oil finish, which highlights the grain and shows off the mock dovetails. When the finish is dry, slip the dividers into their grooves.

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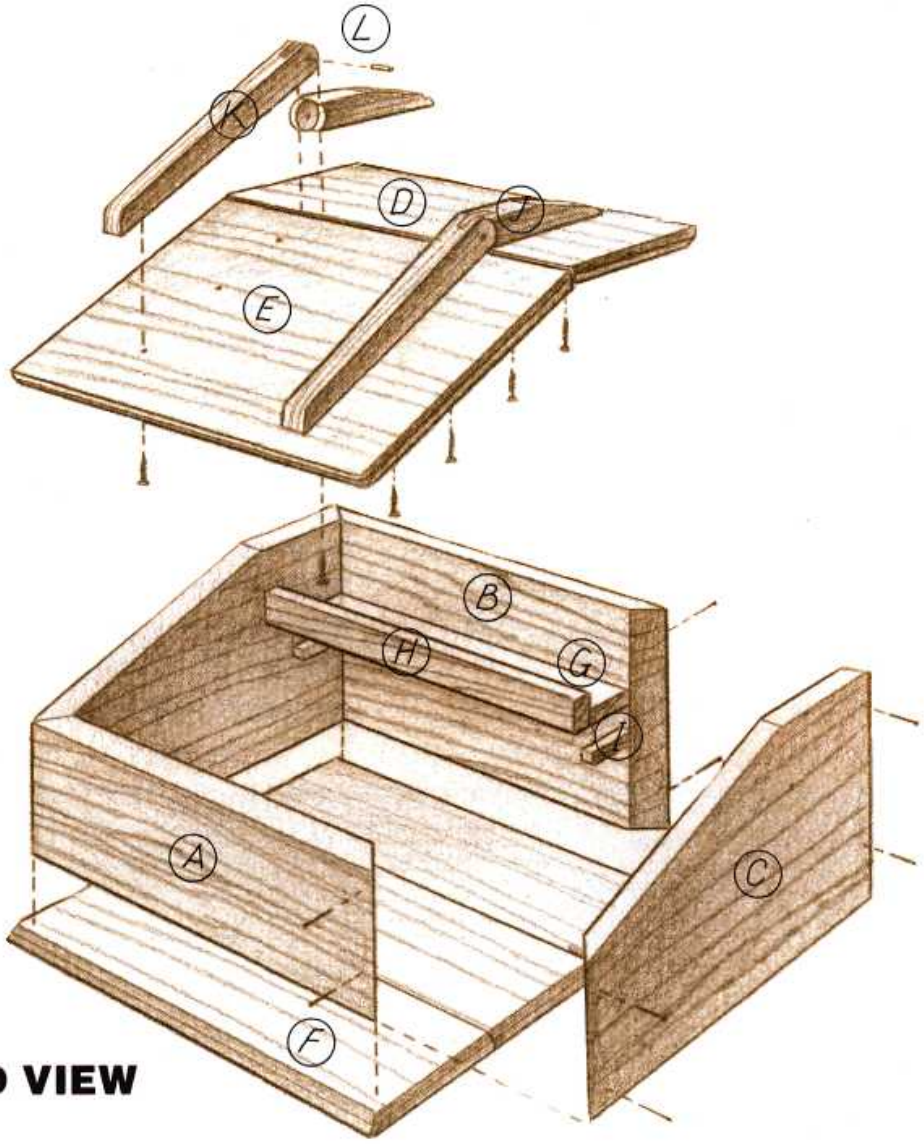
SEWING BOX



EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Front	1	5/8″ × 3¾″ × 10¼″	
B. Back	1	5/8″ × 6½″ × 10¼″	
C. Sides	2	5/8″ × 6½″ × 10¼″	
D. Top	1	5/8″ × 3¾″ × 11¼″	
E. Lid	1	5/8″ × 8⅜″ × 11¼″	
F. Bottom	1	5/8″ × 11¼″ × 11¼″	
G. Shelf	1	⅜″ × 1¾″ × 10″	Cut to fit.
H. Shelf front	1	⅜″ × ⅞″ × 10″	Cut to fit.
I. Shelf supports	2	¼″ × ¼″ × 1¾″	
J. Top hinges	2	5/8″ × ⅞″ × 4¼″	
K. Lid hinges	2	5/8″ × ⅞″ × 8⅝″	
L. Hinge pins	2	¼″ dia. × 2″	Dowel

Hardware

10 #6 × 1-in. brass flathead wood screws
As needed, 3d finishing nails

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1 Select the stock and cut the parts. Choose wood free of knots or defects. Almost any kind of wood is appropriate. Small-size projects like this encourage a fine quality hardwood since the cost of the material is not great. Joint, plane, rip, and cut the parts to the sizes given in the Cutting List. If necessary, glue up boards to make the wider parts.

Bevel the top edge of the front and lid 21 degrees as you rip them to the sizes given.

2 Miter the ends of the front, back, and sides. Set your table saw blade to 45 degrees and cut a couple of test miters in some scrap. Put the test miters together and make sure that the resulting angle equals 90 degrees. Adjust the blade angle as necessary and miter the ends of the front, back, and sides. Guide the stock with a miter gauge set at 90 degrees as you cut the miters.

3 Cut the angle in the sides. Set the box sides, front, and back upright together on a flat surface. Trace the bevel of the front onto the sides. Continue the line to lay out the angle of the sides.

When you have laid out the angle, tape the sides together and cut the angle in both sides in one operation on the band saw. Sand or hand plane any saw marks smooth.

4 Assemble the front, back, and sides. Sand the front, back, and sides. Put glue on the mitered corners and clamp the parts together. A commercially available band clamp works best for a mitered box like this one, because it produces clamping pressure from all directions. Make sure that the box is square.

SHOP TIP: Gluing a mitered box can be a nightmare, because the parts keep slipping around. Prevent this slippage with good old-fashioned masking tape. First, stretch masking tape with the sticky side up across your workbench and put the mitered pieces on the tape end to end (front-side-back-side) with the miters touching. Next, simply fold the miters closed so that the box forms a square. Then, clamp the box with a band clamp, and the tape will keep the miters from sliding around.

5 Chamfer the edges of the top, lid, and bottom boards. Put a chamfering bit in your router. Secure the router in a router table and rout a chamfer on the top, lid, and bottom, as shown in the *Front View* and *Side View.* Guide the stock against a fence as you rout. Note that only three edges of the lid and top are chamfered. Chamfer all four edges of the bottom board.

6 Attach the bottom to the box frame. Position the bottom as shown in the *Front View* and *Side View* and attach it with 3d finishing nails. If you are working with hardwood, predrill holes for the nails. Set the nails and fill the holes with wood putty.

7 Attach the shelf. Glue the shelf and shelf front together to form an *L,* as shown in the *Side View.* Lay out the shelf support positions in the box, then glue and clamp the supports to the box sides.

When the glue dries on both assemblies, glue and clamp the shelf to the shelf supports and to the back of the box.

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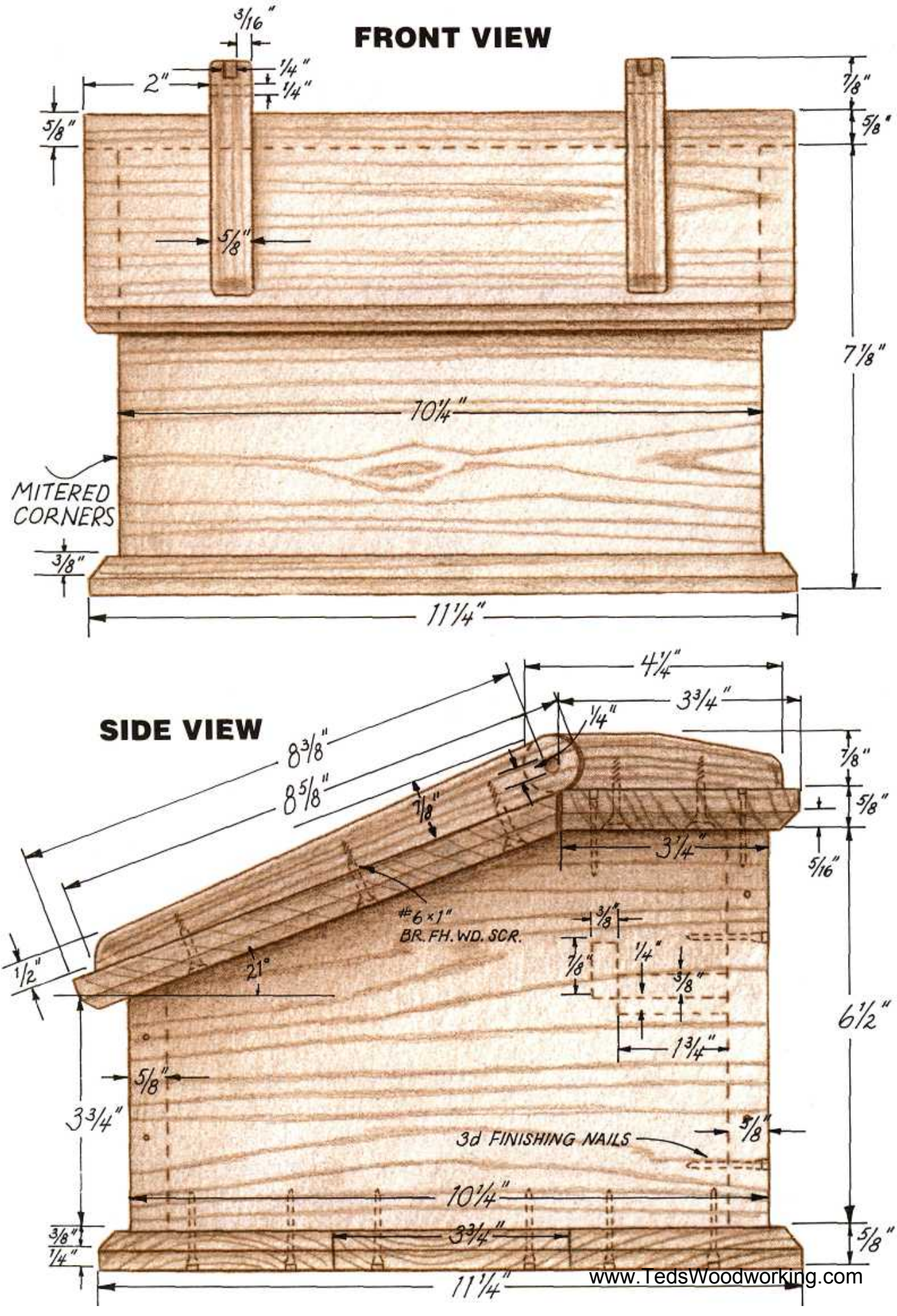

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8 Cut the hinge joint. Draw a ¼-inch grid on a piece of paper and draw the lid hinge and top hinge patterns onto it. Transfer the patterns to the stock and cut the lid hinges and top hinges to shape on a band saw. Sand smooth any saw marks.

Next, cut the notch shown in the *Lid Hinge, Top View* and the tongue shown in the *Top Hinge, Top View* on the band saw. Cut the notch first, and then cut the tongue to fit the notch.

Lay out and carve the curves shown on both sides of the tongue in the *Top Hinge, Side View.* Do not cut into the tongue. Check the fit and trim any excess.

9 Drill the hinge-pin holes through the lid hinges and top hinges. Lay out the hinge-pin holes on the lid hinges, as shown. Put the hinge tongue into the hinge notch and clamp them to the bench. Drill a ¼-inch dowel hole through both for the hinge pin. Drill both hinges.

Chamfer one end of the each hinge pin in a pencil sharpener and insert the dowel into the hinge-pin hole. Check to see that the assembly can move freely and make any necessary adjustments. Repeat the test with the other hinge assembly.

When both hinge assemblies work properly, tap the hinge dowels into their holes until they are about ⅛ inch from coming through the opposite side. Put a drop of glue in the dowel-pin hole and then tap the dowel in the rest of the way. Trim the dowel flush with the sides of the lid hinge.

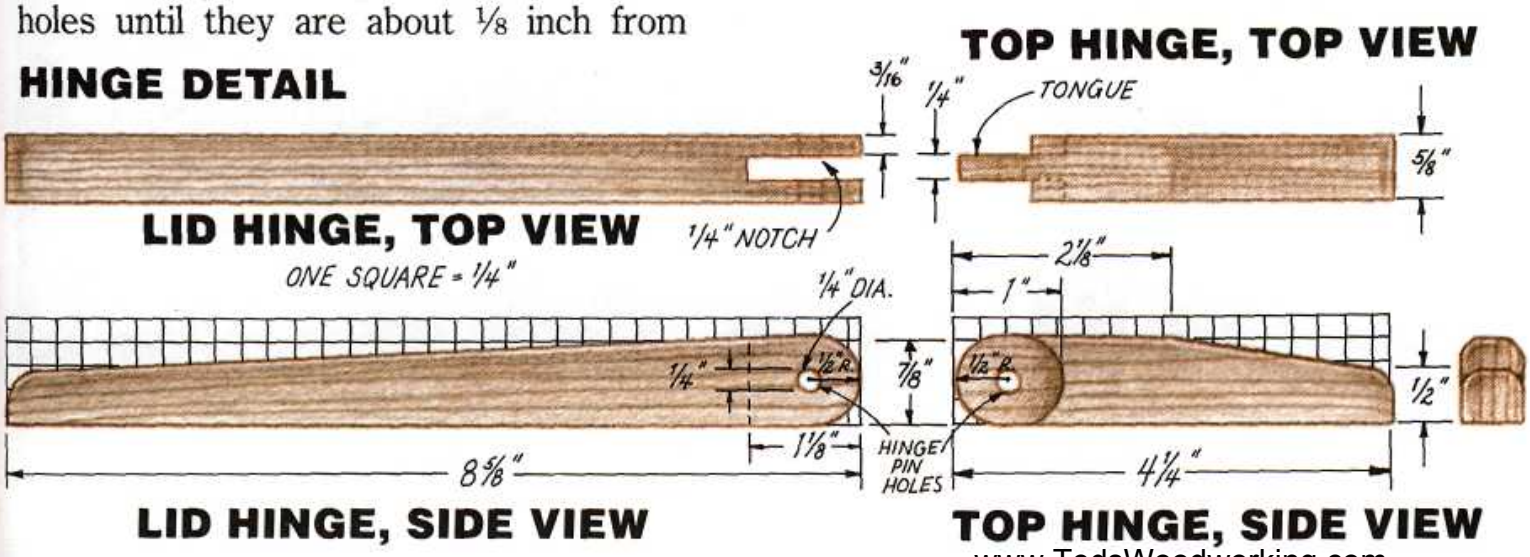
10 Attach the hinge assemblies to the top and lid. Temporarily hinge the box top and lid with masking tape and set them in place on the box. Position the hinges on the box and mark their location. Make sure the lid opens freely.

Drill pilot, clearance, and countersink holes for brass screws through the top and lid into the hinges, as shown in the *Side View.* Remove the masking tape and screw the hinges to the top and lid. Do not glue the hinges.

11 Attach the top to the box. Glue and clamp the box top to the sides and back of the box. Drive 3d finishing nails through the top and into the sides. Predrill for the nails if your box is made from hardwood. Set the nails and fill the nail holes with putty. Clean up any excess glue.

12 Sand and apply the finish. Finish sand the sewing box. Stain and varnish or paint to match your decor.

HINGE DETAIL



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BLANKET CHEST

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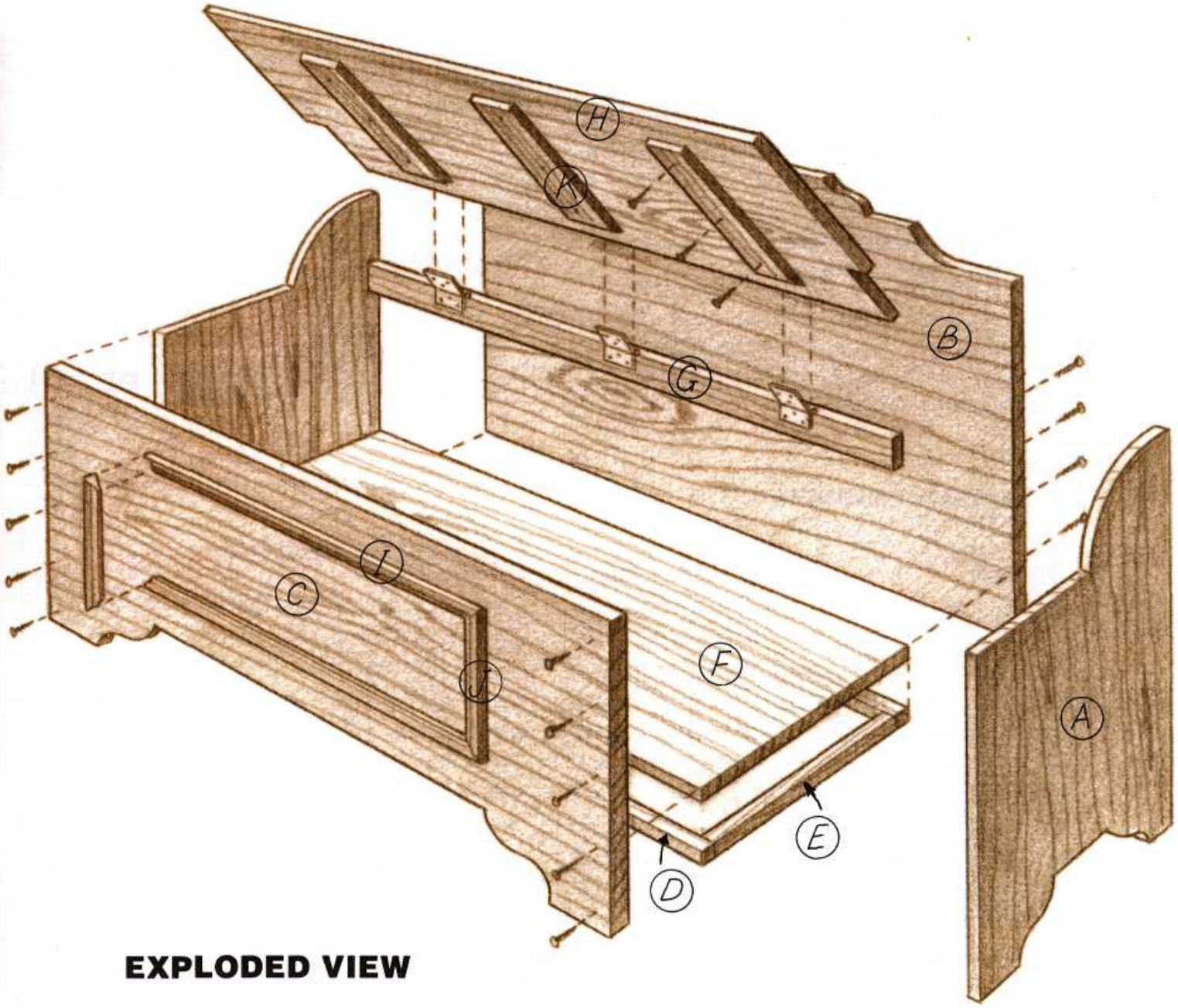

EXPLODED VIEW

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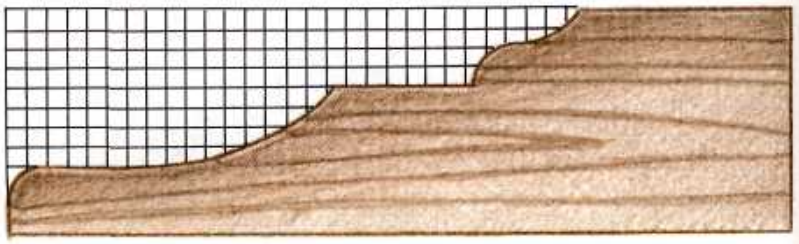
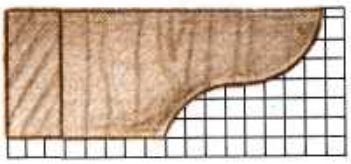
1 Select the stock and cut the parts. The blanket chest shown is made from pine, but various hardwoods will also work fine. You will have to glue several boards together to make up the width of the sides, front, back, bottom, and lid. Choosing flat and straight stock will make assembly easier and more precise. Joint, plane, rip, and cut all of the parts except for the molding to the sizes given in the Cutting List.

2 Cut the sides, back, and feet to shape. First, lay out the radius on each side, as shown in the *Side View.* Next, draw a ½-inch grid on a piece of

BACK DETAIL



ONE SQUARE = ½"



FOOT DETAIL

SHOP TIP: The bottom of this blanket chest could be made of aromatic cedar. Not only will the cedar make the chest smell good, it will also repel fabric-eating moths.

CUTTING LIST

Part	Quantity	Dimension
A. Sides	2	¾" × 17½" × 23½"
B. Back	1	¾" × 28¾" × 43"
C. Front	1	¾" × 17¼" × 43"
D. Long supports	2	¾" × ¾" × 41½"
E. Short supports	2	¾" × ¾" × 16"
F. Bottom	1	¾" × 17½" × 41½"
G. Hinge cleat	1	¾" × 1" × 41½"
H. Lid	1	¾" × 18" × 44"
I. Horizontal moldings	2	¾" × ⅞" × 26"
J. Vertical moldings	2	¾" × ⅞" × 9½"
K. Lid battens	3	¾" × 3" × 15"

Hardware

As needed, #8 × 2-in. flathead wood screws
As needed, #8 × 1¼-in. flathead wood screws
3 2 × 1½-in. hinges (approx. size)
As needed, ⅜-in.-dia. plugs
As needed, 3d finishing nails
2 self-balanced lid supports. Available from The Woodworker's Store, 21801 Industrial Boulevard, Rogers, MN 55374. Part #D7611.

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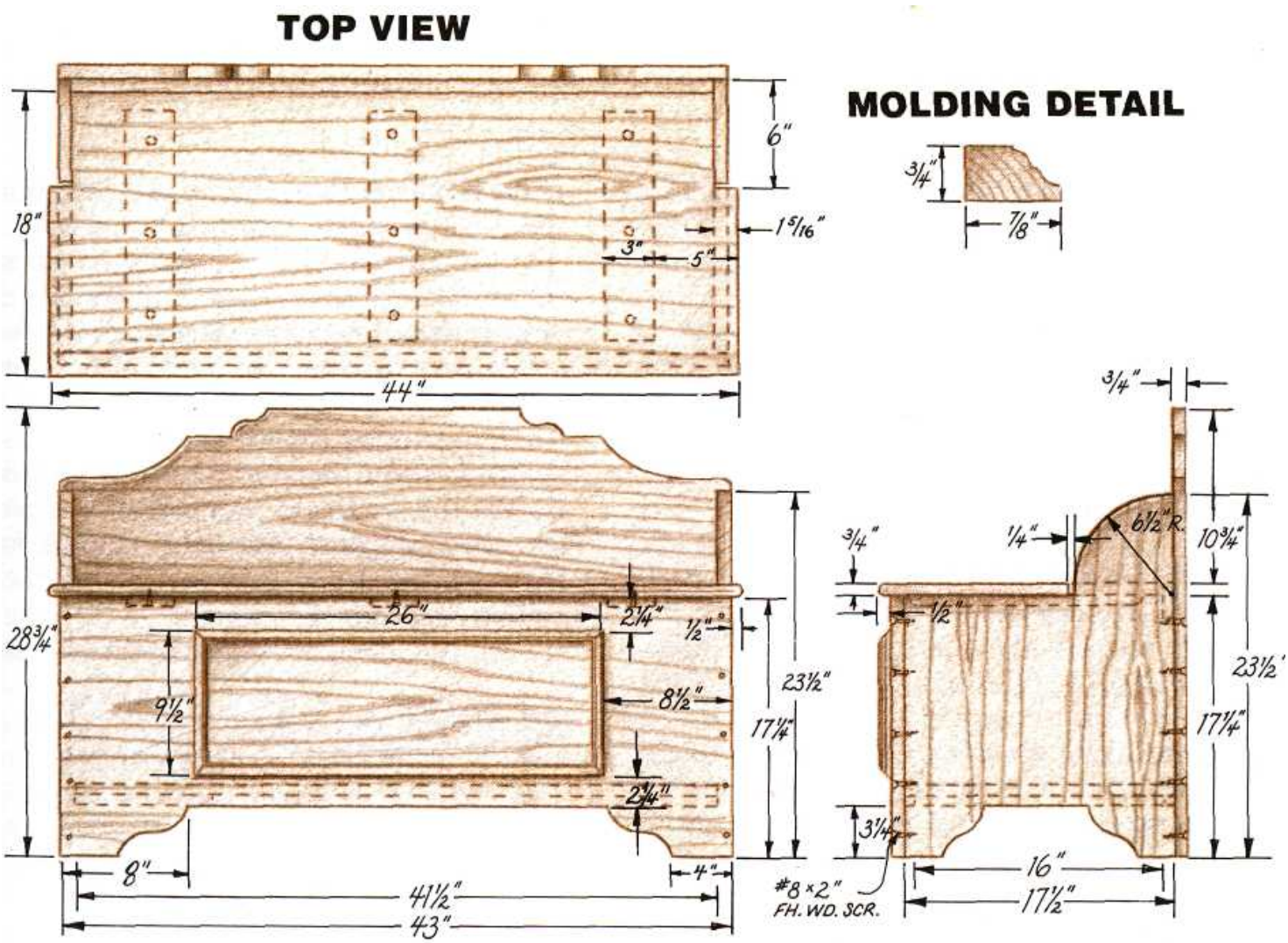

paper and draw the *Back Detail* and *Foot Detail* onto it. Transfer the patterns to the stock. Notice that the side feet are narrower than the front and back feet.

When you've drawn the radii and shapes on the stock, cut the parts to shape with a jigsaw or band saw. Sand the sawed edges smooth.

3 Assemble the sides, front, and back. The sides are butted to the front and back, then screwed in place. Although this joinery is simple, it can be quite a trick holding everything in position while you drill for and drive the screws. The best way to position the parts is by getting someone to help you clamp the sides between the front and back. Make sure your parts are set up on a flat surface, or the assembly may twist. The surface of the sides should be even with the ends of the front and back.

When everything is clamped up properly, lay out and drill evenly spaced plug, clearance, and pilot holes for #8 × 2-inch flathead wood screws, as shown in the *Front View.* Drill the holes with a hand held drill and a combination pilot hole bit. A combination pilot hole bit drills a hole for the plug, a clearance hole for the screw shank, and a slightly smaller pilot hole for the screw threads all in one operation. Combination pilot hole bits are available at most hardware stores and are sold according to the screw size. Drill for five screws along each front corner and six screws along each back corner.

When the holes have been drilled, drive the screws and glue the plugs in place.

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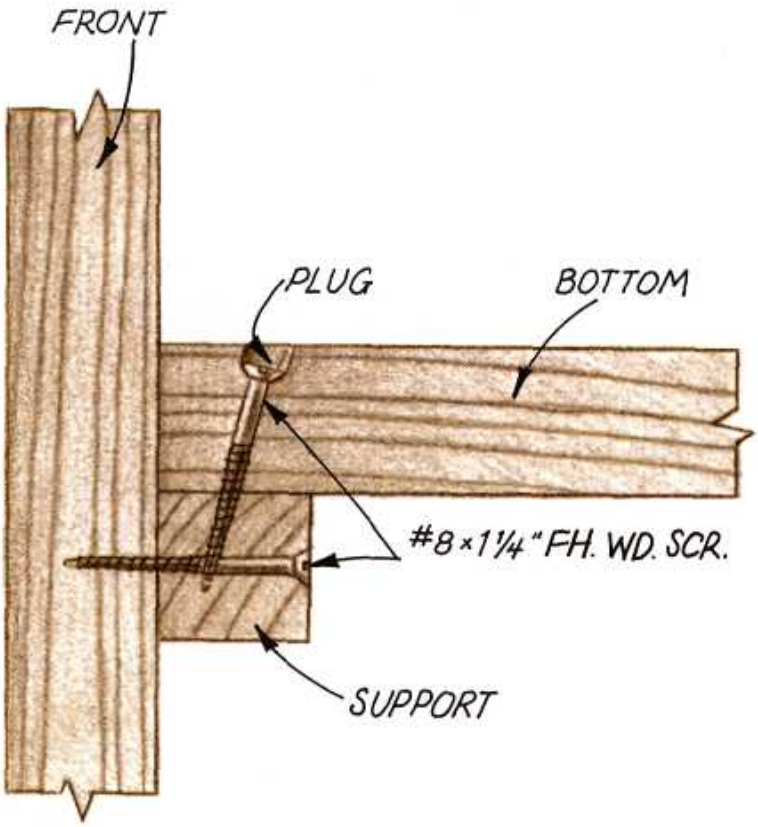
SHOP TIP: Align the sides to the front and back with a power tool called a biscuit joiner. If you have a biscuit joiner or know someone who has one, it's the ideal tool for lining up the sides to the front. The glued-in biscuits will also add structural integrity to this simple butt joint.

4 Attach the bottom. First, attach the long and short supports along the top of the foot cutouts on the front, back, and sides, as shown in the *Front View* and *Side View.* Clamp the long supports in place along the front and back, as shown. Next, drill pilot and clearance holes for #8 × 1¼-inch flathead wood screws along the length of the long supports. Remove the clamps and glue and screw the long supports in place, as shown in the *Bottom Joinery Detail.* Repeat the process with the short supports, but omit the glue.

BOTTOM JOINERY DETAIL



Next, measure the opening and check these measurements against those of the bottom. You may have to remove a little stock from the edges of the bottom for it to fit easily in the opening. Drop the bottom in place on top of the supports, as shown in the *Front View, Side View,* and *Bottom Joinery Detail,* and drill several pilot, clearance, and plug holes for #8 × 1¼" flathead wood screws through the bottom and into the supports. Drive the screws and glue the plugs in place.

5 Attach the hinge cleat. Position the hinge cleat, as shown in the *Side View,* and drill pilot, clearance, and recess holes for #8 × 1¼-inch flathead wood screws at 6-inch centers along its length. Glue and screw the hinge cleat in place.

6 Cut the notches in the lid. Lay out and cut the side clearance notches in the ends of the lid, as shown in the *Top View.* Cut the notch with a jigsaw or band saw and sand the sawed edges smooth.

When the notches have been cut, attach the battens to the underside of the lid with #8 × 1¼-inch flathead wood screws as shown in the *Top View.*

7 Hinge the lid. Put the lid in position over the opening. Make sure that the notches in the lid provide enough clearance, both from side to side and when the lid will swing up on its hinges. Make any necessary adjustments by widening the lid notches or by sanding the side radii.

After making any necessary adjustments, lay out the hinge placement on the back of the lid. Center one hinge along the back of the lid and place the remaining two

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hinges 4 inches from each end, as shown in the *Top View.* Carry your hinge layout lines across to the hinge cleat. Lay out the hinge mortises directly from the hinges and cut them with a dovetail saw and chisel. For more information on hinging, see "Hinge Mortises" on page 7.

Once you've cut the hinge mortises, screw the hinges in place on the back of the lid. Have a helper hold the lid open while you screw the hinges to the hinge cleat.

SHOP TIP: Predrill the hinge screw holes with a special bit called a Vix bit. The Vix bit uses the hinge as a template and automatically centers the screw hole. A stop on the bit lets you set it to drill any depth hole.

8 Mill and attach the molding. Make or buy an 84-inch long piece of molding. The profile of the molding really isn't that important, so it's your choice. The profile shown in the *Molding Detail* is the molding that was chosen for the blanket chest pictured here. The profile shown can be cut with a Bosch classical bit (number 85581M). Put the bit of your choice in your router. Secure the router in a router table and adjust it to cut your desired profile.

When the profile has been cut, miter the horizontal and vertical moldings as you cut them to length. Cut the horizontal and vertical pieces to the lengths given in the Cutting List.

Attach the molding to the front, as shown in the *Front View,* with 3d finishing nails. Set the nails and fill the holes with wood putty.

9 Sand and apply the finish. Sand the plugs even with the surface of the wood and sand away any excess glue. Paint or stain and varnish your blanket chest. If you wish, add some stenciled ornaments to the chest.

When the finish is dry, add a pair of heavy-duty lid supports to the blanket chest. You can usually find a variety of lid supports at a hardware store. Self-balanced lid supports, available from the source given in the Cutting List, help keep the lid from crashing down unexpectedly.

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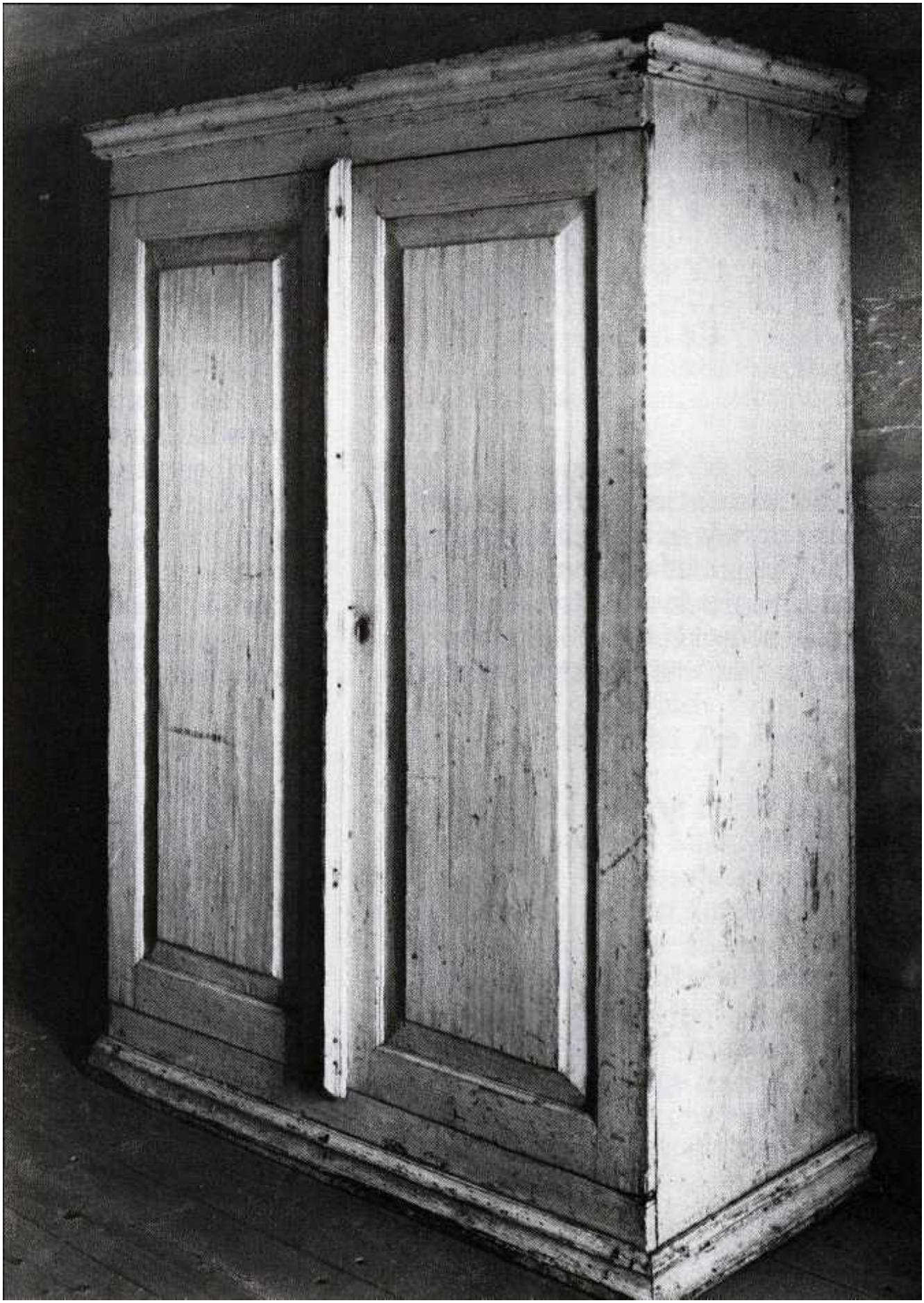
ARMOIRE



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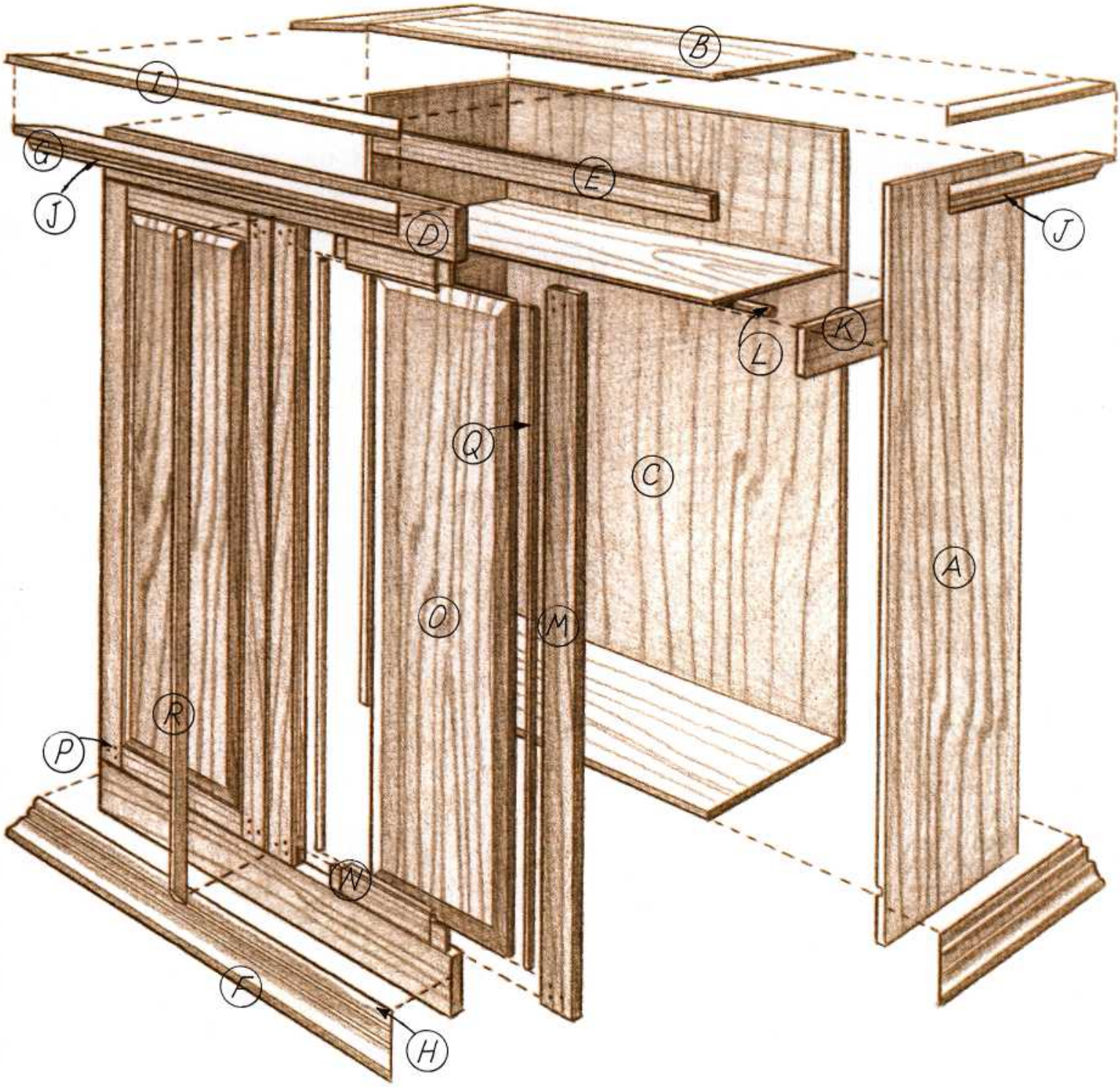

EXPLODED VIEW

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1 Select the stock and cut the parts. Joint, plane, rip, and cut the parts to the sizes given in the Cutting List. If necessary, glue up boards to make the wider parts.

If you have access to a shaper, you can make the moldings yourself. Otherwise, purchase the moldings through a local lumber yard. Because the the types of wood available in ready-made moldings are usually limited, you may have to stain the stock to match the rest of the armoire. The plywood back is a modern addition. If you wish to be true to the original, nail random-width boards across the back instead.

2 Dado the sides. Lay out the dadoes, as shown in the *Front View* and *Side View.* Rout the dadoes as explained in "Routed Dadoes" on page 52.

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Sides	2	¾" × 19½" × 83¼"	
B. Top/bottom/shelf	3	¾" × 18¾" × 47¼"	
C. Back	1	¾" × 48" × 78"	Plywood; cut to fit.
D. Front rails	2	¾" × 6" × 49"	Cut to fit.
E. Stop rail	1	¾" × 2½" × 48"	Cut to fit.
F. Baseboard	1	¾" × 3½" × 96"	Cut to fit.
G. Cove molding	1	¾" × 2¼" × 17'	Cut to fit.
H. Quarter-round lower bead molding	1	⅝" × ⅝" × 96"	Cut to fit.
I. Top frame	1	¾" × 4" × 120"	Miter to fit.
J. Quarter-round upper bead molding	1	⅜" × ⅜" × 96"	Cut to fit.
K. Clothes rod supports	2	¾" × 5½" × 18½"	
L. Clothes rod	1	1⅛" dia. × 48"	Cut to fit.
M. Door stiles	4	¾" × 3" × 72"	Cut to fit.
N. Door rails	4	¾" × 3" × 22"	Cut to fit.
O. Raised panels	2	¾" × 18¾" × 65$^{11}/_{16}$"	
P. Door pegs	24	¼" × ¼" × 1"	
Q. Door bead	1	¼" × ¼" × 32'	Cut to fit.
R. Door lip	1	⅞" × 1⅜" × 72"	Flat astragal molding; cut to fit.

Hardware

As needed, #8 × 1¾-in. flathead wood screws
As needed, ⅜-in.-dia. wooden plugs
As needed, #8 × 1¼-in. flathead wood screws
6 ¾ × ½-in. butt hinges

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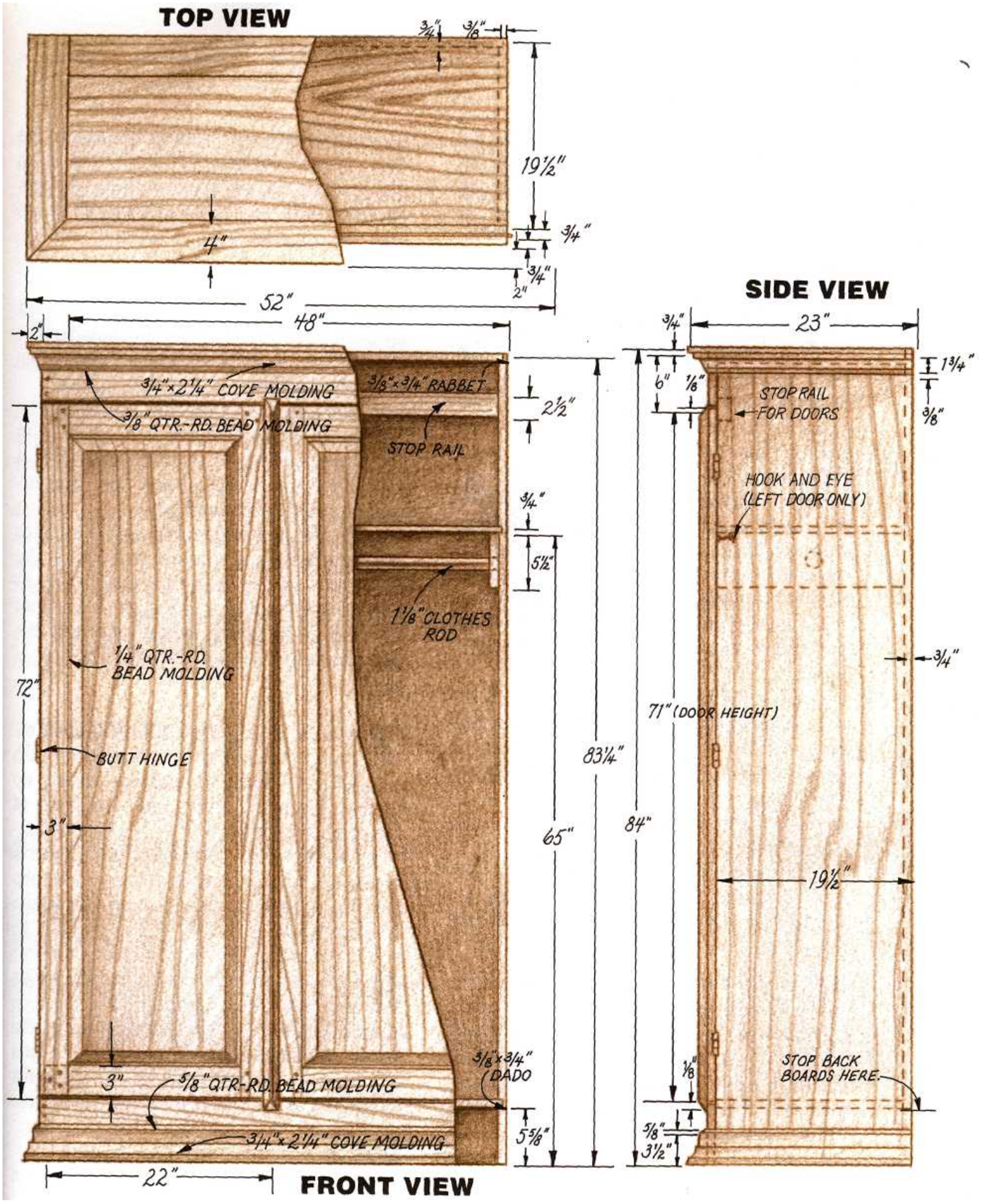

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3 Rabbet the sides for the back. To rout the rabbet for the back, put a ¾-inch straight bit in your router. Set the router and router fence attachment to cut a ⅜ × ¾-inch rabbet.

4 Assemble the carcase. On a flat surface, clamp the carcase together without glue, so that the rabbet faces up. Predrill through the cabinet sides into the shelf, top, and bottom for #8 × 1¾-inch flathead wood screws. Use a commercially available combination pilot hole bit when drilling. This bit drills a hole for the plug, a clearance hole for the screw shank, and a slightly smaller pilot hole for the screw threads all in one operation. Pilot hole bits are available at most hardware stores and are sold according to the screw size. Screw the cabinet together. Plug the holes with wooden plugs, which you can either cut with a plug cutter or buy at the lumberyard.

Once the case is assembled, check to make sure it is square. Measure diagonally from corner to corner. The cabinet is square when the measurements are equal. If they are not equal, push the corners of the long diagonal gently together until the measurements match.

When the cabinet is square, cut the back to fit and put it in place. Predrill, as before, for #8 × 1¼-inch flathead wood screws.

5 Attach the rails on the front. With a helper, turn the case onto its back. Cut the front rails to fit across the top and bottom of the case. Position the top and bottom rails on the case. Drill through the rails into the top and sides, but not into the bottom shelf. Attach the rails with glue and #8 × 1-¼-inch flathead wood screws. Moldings, attached later, will cover the screws. Glue and screw the door stop to the back of the top rail, from inside the cabinet. Leave these screws exposed—they're in the cabinet where no one will see them.

6 Attach the moldings. The moldings on the top and bottom are built up from several moldings, as shown in the *Front View.* As you work, miter each piece to fit the cabinet.

Work from the bottom up. Miter the baseboard to fit and nail it in place. Cut the cove molding to fit over it and nail it in place. Miter and attach the quarter-round lower bead molding.

To install the top moldings, first miter and attach the top frame, as shown in the *Top View.* Miter the cove molding to fit around the front and sides of the cabinet and nail it in place. Miter and nail the quarter-round upper bead molding in place.

7 Install the rod. Drill a 1¼-inch diameter hole in each rod support with a hole saw. Snug a support board up against the shelf, even with the front of the case. Predrill for #8 × 1¼-inch flathead wood screws and screw the supports in place. Put the clothes rod in place, slip the other support in place, and screw the support to the side.

8 Cut the door parts to fit. The stiles and rails in the Cutting List are 1 inch longer than necessary. Cut them to fit the actual cabinet. Cut the stiles to ¼ inch less than the actual opening. Cut the rails to leave a ¼-inch gap between the doors.

9 Cut a groove for the raised panels. Put a ¼-inch dado cutter in

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the table saw and cut a groove ⅜ inch deep along the middle of one edge of the rails and stiles. Guide the cut along the rip fence. To ensure that the grooves will align on assembly, keep the outside face of the door against the fence for each cut.

10 Mortise and tenon the rails and stiles. Lay out the mortises and tenons, as shown in the *Joinery Detail.*

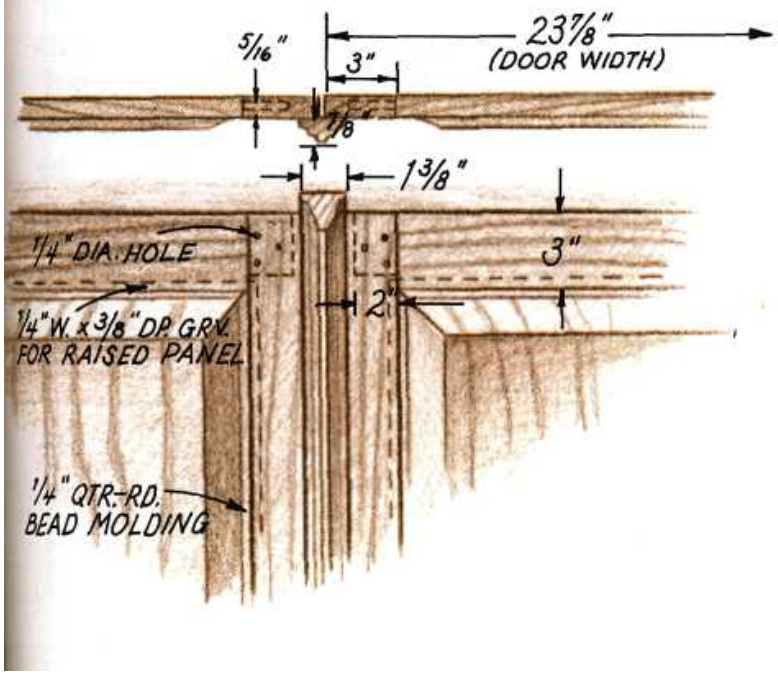
To cut the mortises, drill a series of adjoining ¼-inch-diameter holes, 2 inches deep, inside the layout lines. Cut out the remaining waste with a sharp chisel.

Lay out the tenons, as shown. Cut the tenons by repeatedly passing the stock over a dado blade. Set up the cut with a test piece of scrap the exact thickness of the rail. Raise the blade to remove ¼ inch of wood. Guide the test piece over the blade with the miter gauge; turn the board over and repeat. Check to see how the resulting tenon fits in the mortise. Adjust the height of the blade, as necessary, for a snug-fitting joint.

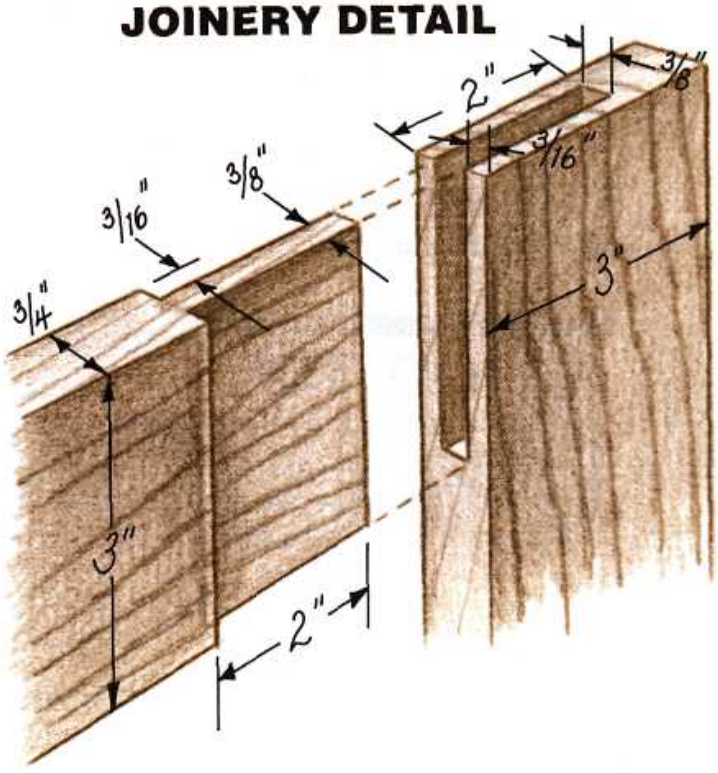
Use the fence to control the length of the tenon. Position the fence so that when you guide the end of the stock along it, the blade cuts a shoulder 2 inches from the end of the board. Remove the rest of the wood by repositioning the stock in the miter gauge. Leave the fence where it is to help with subsequent tenons.

SHOP TIP: Lay out the joinery so that any bow in the stock faces what will be the front of the door. Closing the doors on the finished cabinet will temporarily flatten the bow, and the doors will close tightly against the cabinet.

DOOR DETAIL



JOINERY DETAIL



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11 Raise the panels. Raise the panels on the shaper, if you have one. If not, cut them on the table saw, as explained in "Raised Panels" on the opposite page.

SHOP TIP: Sand the panels and put a coat of finish or stain on the panels so that any subsequent movement once the panel is framed will not reveal unfinished wood.

12 Assemble the doors. First, test fit the rails and stiles around the raised panels and make sure all the joints close snugly when lightly clamped. Make any necessary adjustments. Apply glue sparingly to the cheeks of the mortise and tenons, and clamp the door together. Check to make sure the door is square by measuring across the diagonals. If one diagonal is long, loosen the clamps. Angle the clamps in the direction of the long diagonal and gently retighten. Check again to make sure the door is square and readjust the clamps, if necessary.

Do not glue the panel in place. It must be allowed to expand and contract with changes in humidity.

SHOP TIP: Rub paraffin on the corners of the panel before assembling the door. The paraffin will keep any glue that squeezes out of the mortise from sticking to the panel.

13 Peg the joints. Drill three ¼-inch holes through each mortise and tenon, as shown in the *Front View* and *Door Detail.* The exact spacing of the holes isn't critical. Clamp a piece of scrap behind the joint before you drill to prevent the bit from tearing out wood when it exits the stock. Drive square door pegs through the holes. Square pins are traditional on pegged mortises.

14 Install the door molding. Miter the bead molding to fit around the inside of the door frame and glue it to the edge of the door.

Test fit the doors. Plane the doors to create an equal reveal top and bottom. When satisfied with the fit, lay out and cut the hinge mortises and hang the door, as explained in "Hinge Mortises" on page 7.

Cut the door lip to fit across the gap between the doors. Attach it to the right-hand door.

15 Apply the finish and install the remaining hardware. Remove the doors and apply your favorite finish, being sure to apply equal amounts on all the surfaces. When completed, make sure the case is standing plumb and level and rehang the doors. When the doors are back in place, add handles, a hook and eye set, and a wardrobe lock of your choice.

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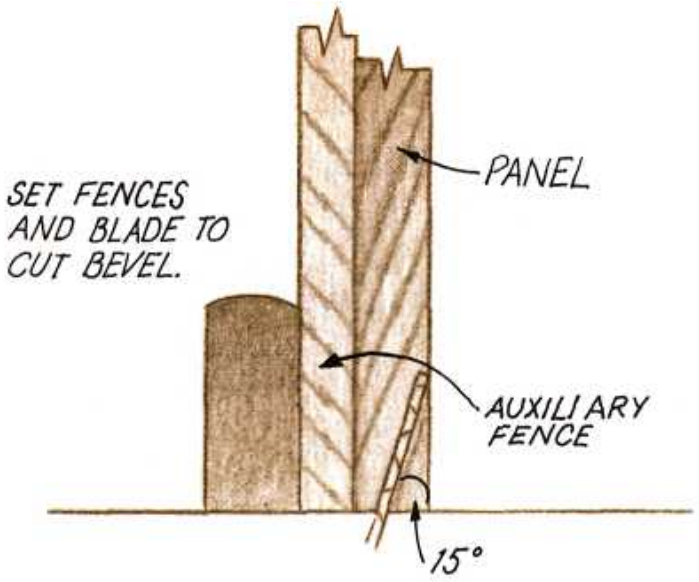
RAISED PANELS

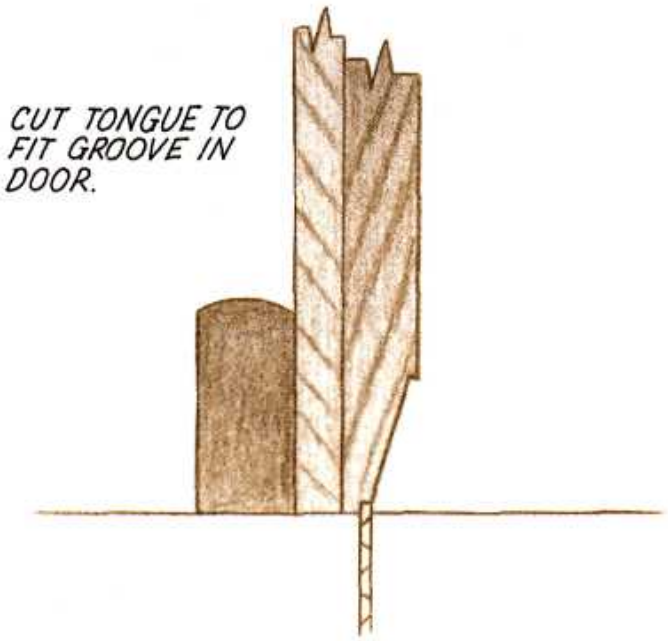
1 Cut the bevels. Raising panels on the saw requires running stock through the saw on edge. To keep the panel from wobbling, screw or clamp a tall auxiliary fence to your table saw fence, as shown. Hold the panel against the auxiliary fence as you cut.

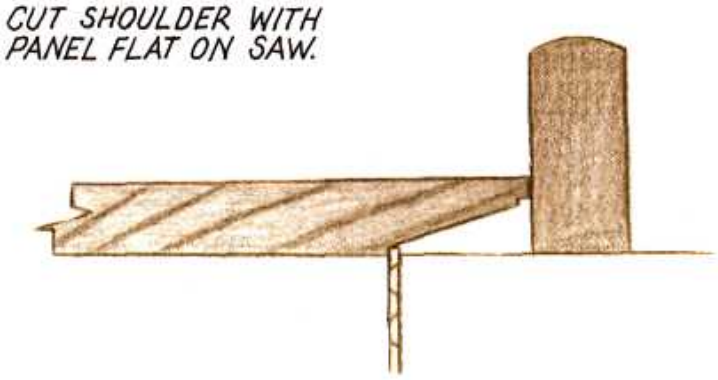
To set up the cut, put the table saw fence with the attached tall auxiliary fence to the left of the blade, and set the saw blade to 15 degrees. The saw blade should tilt away from the fence. Adjust the rip fence to cut a bevel that at its narrowest is as wide as the groove for the panel—⅜ inch in this case. Raise the blade until it just cuts through the face of the panel as shown. Cut a bevel on all four edges of the panel.

2 Cut the tongue. Set the blade to 90 degrees. Adjust the blade height and fences to cut a tongue that fits snugly in the door groove.

3 Cut the shoulder. This cut creates a step between the bevel and the face or "field" of the panel. Remove the tall auxiliary fence and adjust the height of the blade to cut a ⅛-inch step between the field and the bevel. Cut the step with the field flat on the table saw, as shown.







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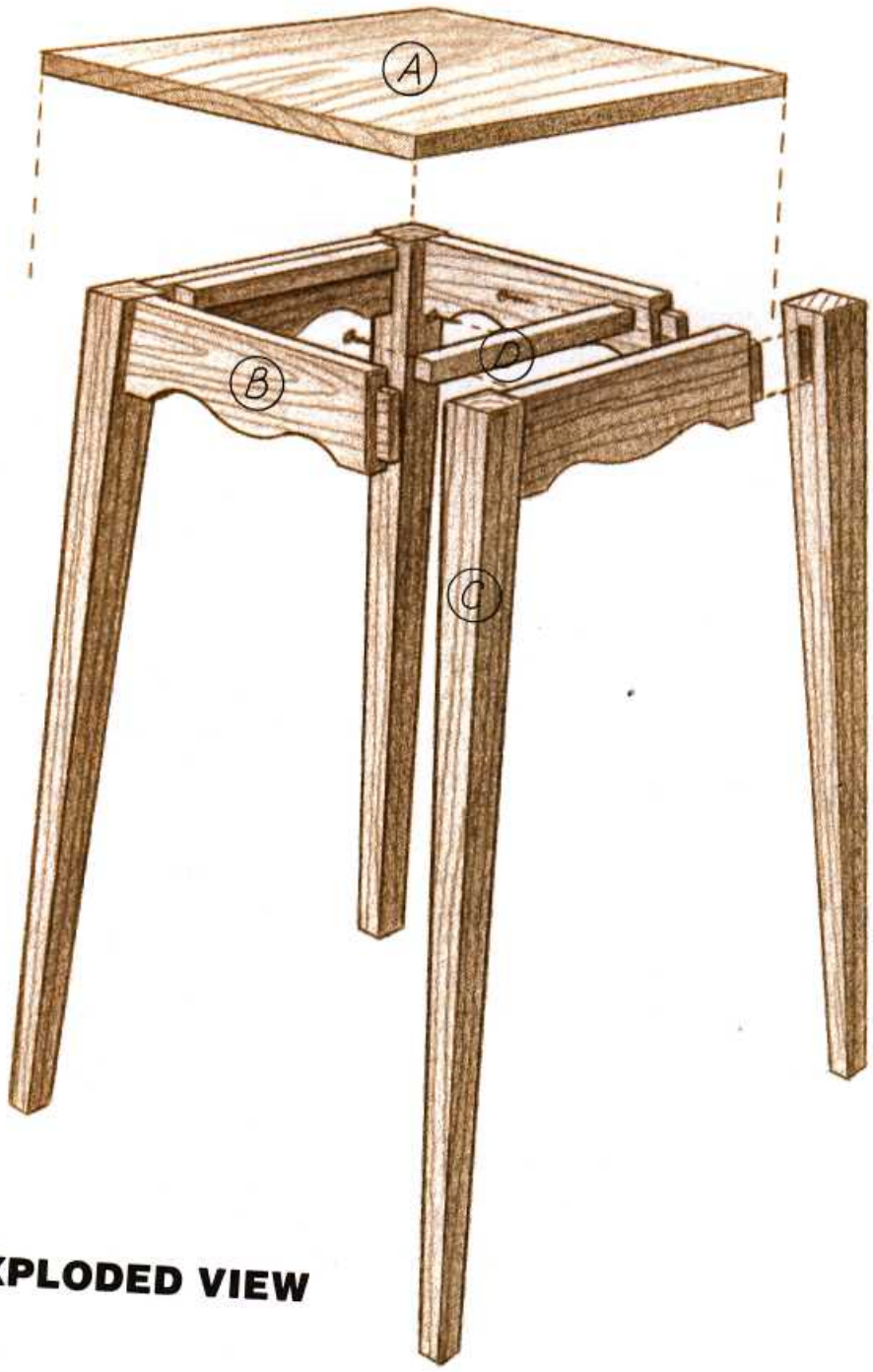
LAMP STAND



EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension
A. Top	1	¾″ × 14″ × 14″
B. Aprons	4	¾″ × 3″ × 10½″
C. Legs	4	1¼″ × 1¼″ × 28¼″
D. Cleats	2	¾″ × ¾″ × 9″

Hardware

12 #8 × 1¼-in. roundhead wood screws and washers

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1 Select the stock and cut the parts. The lamp stand shown is made of pine. You might consider making yours out of a hardwood like cherry, which was often used in the construction of small, thin-legged tables. Maple, walnut, or mahogany would also be suited to this project. Joint, plane, rip, and cut the parts to the sizes given in the Cutting List. If necessary, glue up boards to make the top.

2 Bevel the aprons. Because legs on this table angle outward, the ends of the apron are also angled. Set your miter gauge to 2 degrees. Put an apron flat on the table saw with the top edge against the miter gauge. Miter both ends of each apron.

3 Cut the tenons in the aprons. To set up the cut, put a dado blade in the table saw and clamp a wooden fence along the length of the saw's rip fence. Position the fence so that you can slowly crank the dado blade into it and leave ½ inch of blade exposed. Be careful not to hit the permanent fence.

With the miter gauge still set at 2 degrees, guide the aprons along the fence and over the blade to cut the cheeks of the tenon.

Cut ½ inch off the top and bottom of each tenon with a dovetail saw or other precision-cut hand saw. Take care not to damage the outside face of the apron.

4 Cut the shape in the aprons. Draw a ¼-inch grid on a piece of paper and draw the apron pattern onto it. Transfer the pattern to the wood and cut the shape with a band saw or jigsaw.

To get aprons with identical curves, cut them all at once. First stack the pieces together and secure by putting double-sided tape between them. Then cut the aprons in one operation.

5 Taper the legs. Lay out and cut the leg tapers, as shown in the *Leg Taper Detail.* Mark the tapers on two adjacent edges of the legs. Cut the tapers on the band saw. Make the cuts about 1/16 inch to the outside of the taper lines. Cut away the last 1/16 inch with a hand plane or jointer.

SHOP TIP: You can also cut tapers on a table saw with a commercially available taper jig. These jigs allow you to cut a taper that requires much less cleanup. The taper jig should be adjusted so that when guided against the table saw fence, the taper layout lines on the leg are parallel to the table saw blade. Adjust the fence to cut the taper along the layout lines.

6 Cut the mortises. Cut mortises on the inside faces (tapered edges) of the legs to accept the apron tenons. Lay out 2-inch-long mortises on the legs beginning ½ inch from the top, as shown in the *Top Joinery Detail.* To cut the mortises, first drill out a series of ⅜-inch holes inside the layout lines. Then cut up to the layout lines with a sharp chisel. Test fit the tenons and make sure that the top edges of the aprons are even with the top of the legs. Make adjustments as necessary.

7 Assemble the base. Glue the apron tenons into the leg mortises. The top edge of the aprons should be even with the top of the legs. Clamp the table base

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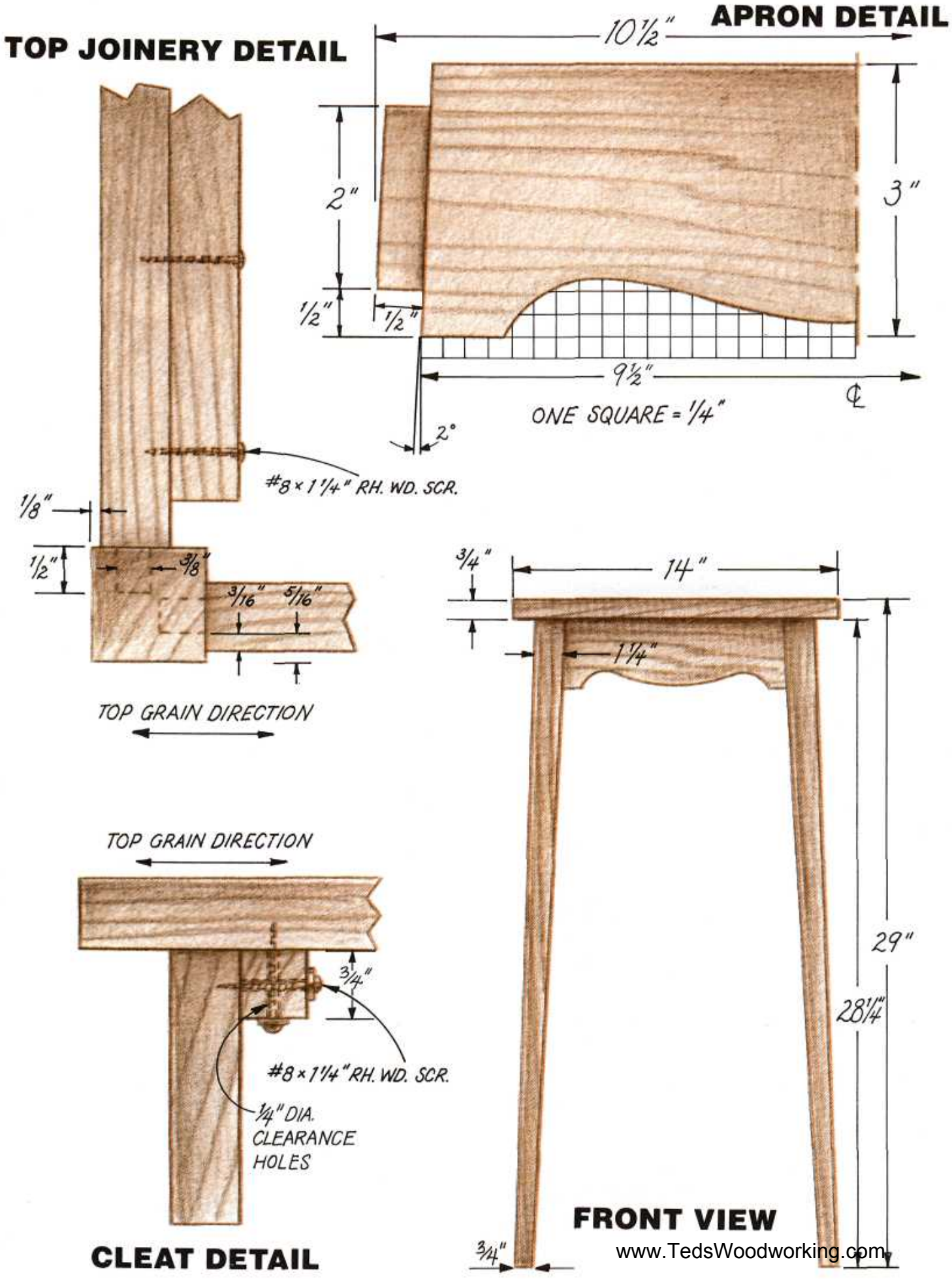

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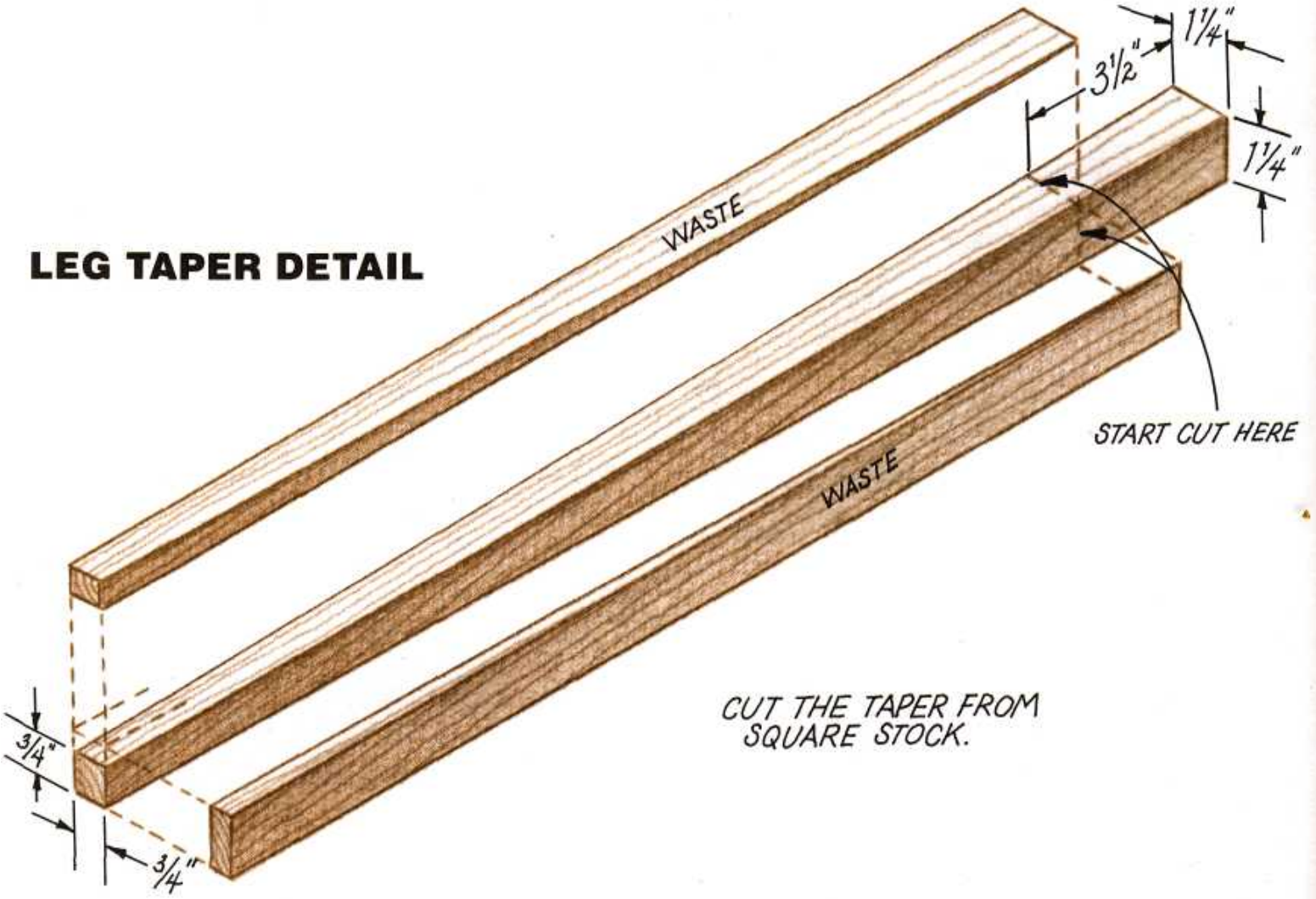

together. Make sure that the base is square by measuring diagonally from corner to corner. If the measurements are equal, the table is square. If the measurements are unequal, clamp lightly across the long diagonal until the diagonals are the same length.

8 Attach the top. Drill three evenly spaced holes in two adjacent faces of the cleats, as shown in the *Cleat Detail.* Glue and screw the cleats to two parallel aprons. Center the top on the legs, so that the grain runs perpendicular to the cleats. Screw, but do not glue, the top to the cleats. The oversize holes in the cleats will allow the top to expand and contract with changes in humidity.

9 Apply finish. Sand the table and slightly round all of the edges. The table shown has been stained, but you can finish your table in a way that best fits your decor. If your table is made from cherry or other hardwood, you may want to highlight the grain with an oil finish.

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LIAR'S BENCH

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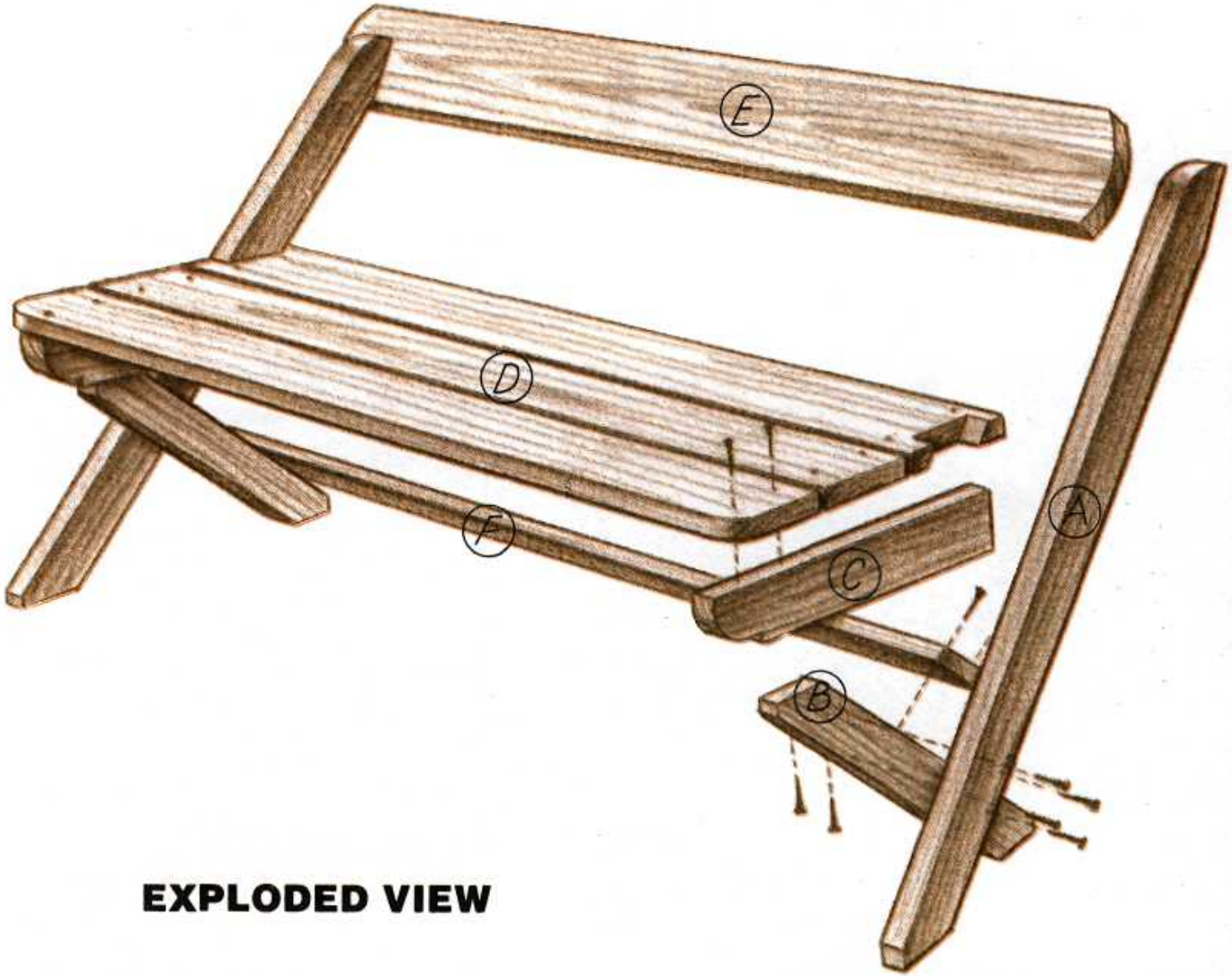

EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension
A. Long legs	2	1⅜" × 2¾" × 33⅞"
B. Short legs	2	1⅜" × 2¾" × 23⅝"
C. Seat supports	2	1⅜" × 2¾" × 17"
D. Seat boards	3	15/16" × 5¾" × 48"
E. Back	1	15/16" × 5¾" × 51⅛"
F. Bottom support	1	¾" × 2¾" × 45⅜"

Hardware

4 #12 × 3-in. drywall screws
16 #12 × 2¼-in. drywall screws
20 #12 × 2-in. drywall screws

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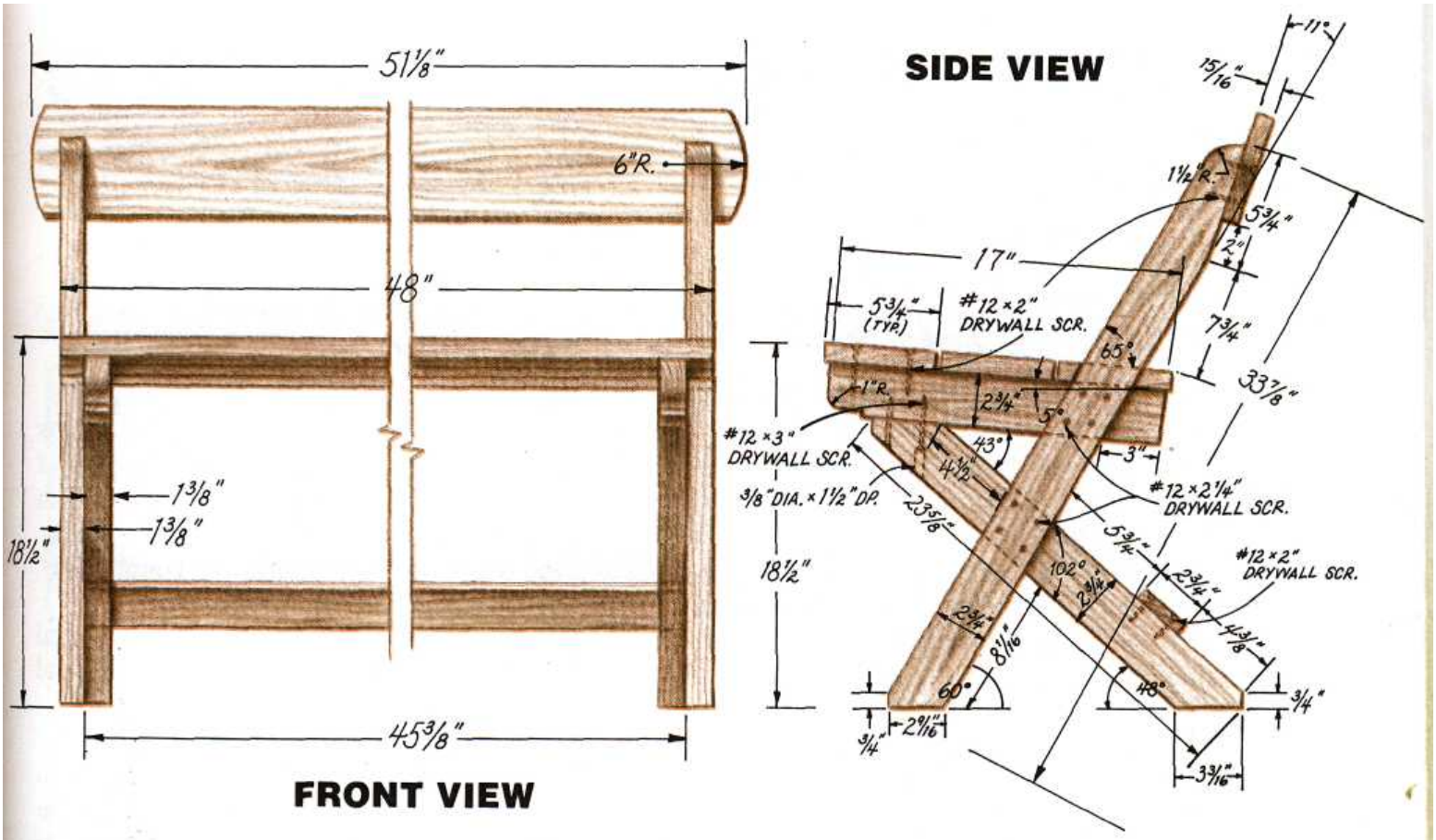

1 Select the stock and cut the parts. Almost any clear hardwood or softwood is suitable for this bench. If you plan to use this outdoors, cedar or mahogany would be good choices. Choose straight, flat stock. A few small knots are acceptable in this piece. Joint, plane, rip, and cut the parts to the sizes given in the Cutting List.

2 Cut the long and short legs and the seat supports to shape. Lay out the angles on the leg, as shown in the *Side View.* The easiest way to cut the sharp angles in the legs is with a good old-fashioned, muscle-powered crosscut saw. Hold the stock down on some sawhorses or a low bench and make the cut to the waste side of your layout lines. Sand away any saw marks.

Cut the curve in the front edge of seat supports and top of the long legs with a jigsaw or band saw, as shown in the *Seat Support Detail* and the *Side View.* Stay to the waste side of your layout lines as you cut. Clean up the sawed edges with sandpaper.

3 Lay out and assemble the legs and seat supports. Arrange the legs and seat supports on top of each other as they will be when assembled. Use a protractor to set a sliding T-bevel to the angles shown in the *Side View* and align the parts with it.

Clamp the legs and seat supports in position with C-clamps. Compare the two end assemblies by standing them next to each other with their seat supports side by side. Make sure that everything is po-

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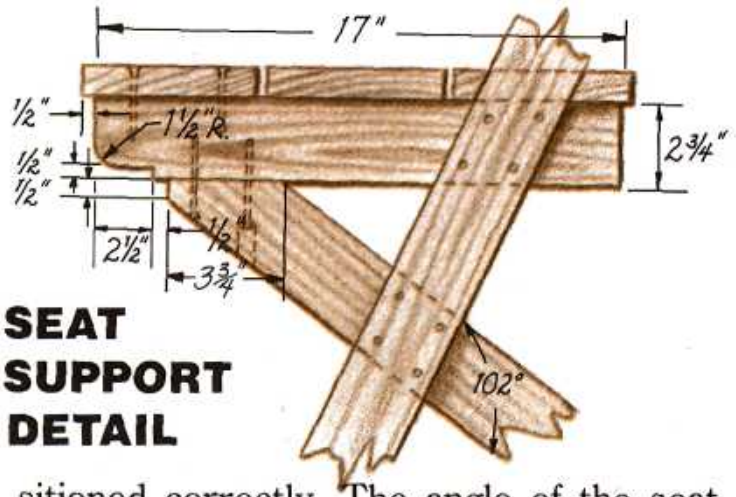


SEAT SUPPORT DETAIL

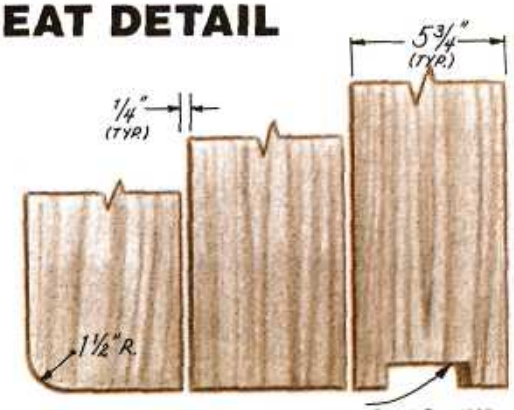
sitioned correctly. The angle of the seat supports and legs should match, and the long legs should be on the opposite sides of their seat supports. Make any necessary adjustments.

With the legs and seat supports still clamped, predrill and screw together each end assembly. Attach the long legs to the short legs and seat supports with four #12 × 2¼-inch drywall screws, as shown in the *Side View.* Attach the short legs to the seat supports with two #12 × 3-inch drywall screws angled up through the short legs and into the seat supports, as shown. Because of the angles involved, you must counterbore 1½ inches in each short leg for one of the screws, as shown.

4 Notch the rear seat board. The rear seat board is notched to fit around the long legs, as shown in the *Seat Detail, Top View.* To lay out the notch, put the seat board on one of the seat supports so that the end grain is against the long leg. Trace the location of the leg onto the end grain. Set a marking gauge to the thickness of the leg and lay out the depth of the notch on the top and bottom of the seat board. Repeat on the other end of the board.

Cut along the angled lines with a dovetail saw or back saw, until you reach the scribe line. Cut along the scribe line with a jigsaw to remove the waste.

SEAT DETAIL



TOP VIEW

CUT NOTCH TO FIT AROUND LONG LEG.

5 Cut curves in the back board and front seat board. With a jigsaw cut the front seat board and the ends of the back board to the profiles shown in the *Front View* and *Seat Detail, Top View.* Sand away any saw marks or roughness.

6 Assemble the bench. Sand the end assemblies, seat boards, back, and bottom support.

On a flat surface, position the seat boards on the end assemblies, as shown in *Side View* and *Front View.* Clamp the seat in place. Next, clamp the back to the long legs. Clamp the bottom support to the short legs, as shown in the *Side View.* When everything is positioned correctly, predrill and countersink holes for #12 × 2-inch screws, as shown in the *Side View.* Drive the screws and remove the clamps.

SHOP TIP: To keep the ends from falling over while you position the other parts, clamp two 51-inch lengths of scrap between them. Position the ends the proper distance apart and begin assembly.

7 Sand and apply the finish. Give the assembled bench a final sanding. If your bench will be outside, protect it with a weather-resistant finish like spar varnish.

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GATELEG TABLE

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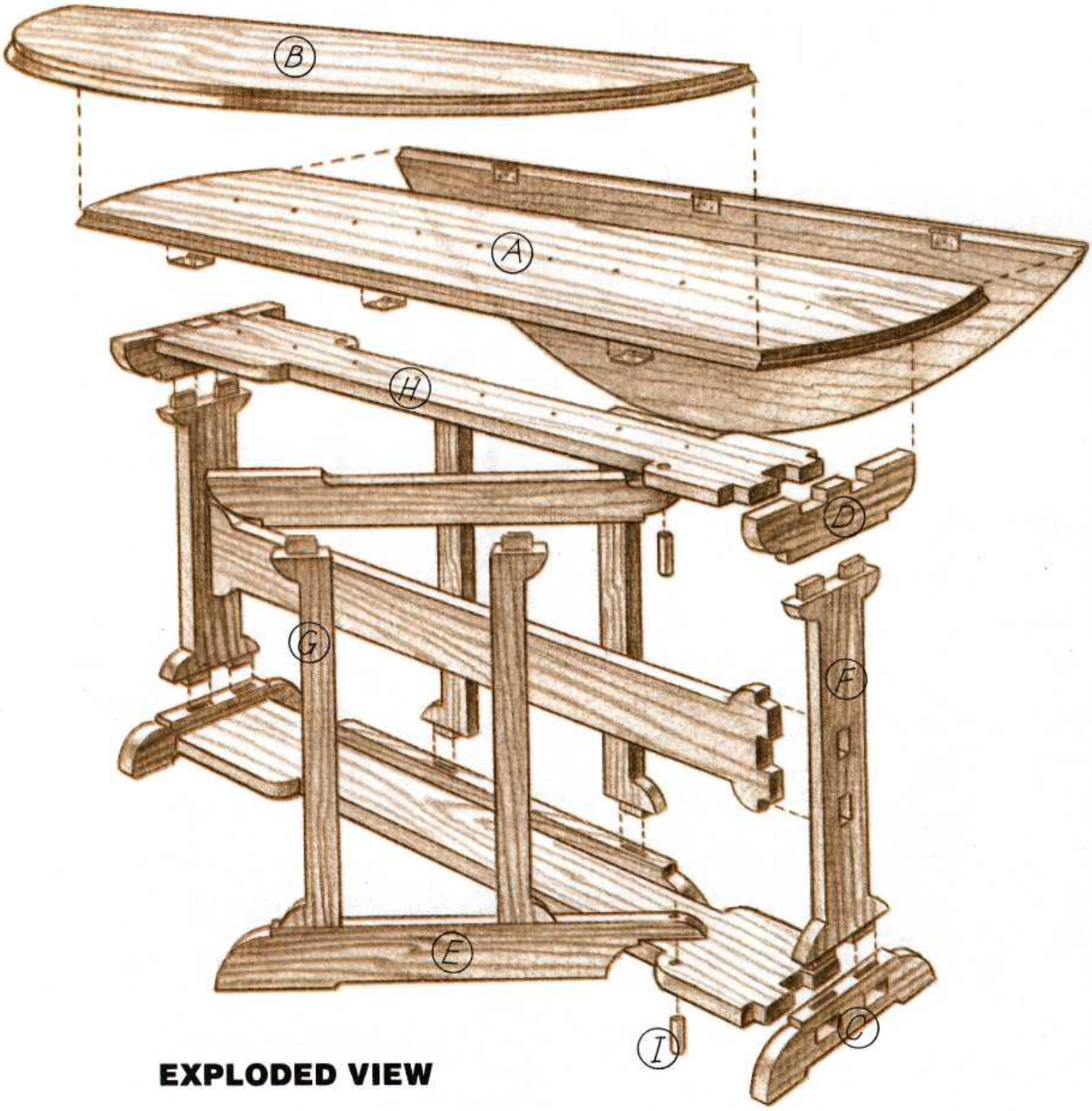

EXPLODED VIEW

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1 Select the stock and cut the parts. The gateleg table shown is made from pine, but it can be made from almost any kind of wood. Choose straight, flat stock. Joint, plane, rip, and cut the stock to the sizes given in the Cutting List.

You'll have to glue several boards together to create the top and leaves. When the leaves and top are glued, hand plane or sand the glue joints even.

SHOP TIP: When you need to create a wide, flat surface, it is better to glue together several narrow boards than to create the width with a few wide boards. Wide boards often cup, warp, or split as humidity changes. If you want the appearance of wide boards, rip wide boards down the middle, then carefully joint and glue them back together.

2 Lay out and rout the rule joint between the top and leaves. A rule joint is made by routing a roundover in the long edges of the tabletop and a cove in the adjoining edge of each leaf.

Start by making the roundover to the dimensions shown in the *Rule Joint Detail.* Clamp the top, with its bottom down, to a workbench or other stable work surface. Let one of the long edges of the top hang over the edge of the work surface and cut the roundover in a series of passes with a router and ½-inch-radius roundover bit. Lower the bit with each pass until you match the profile shown. Then rotate the tabletop and rout the remaining edge.

Next, rout the cove in the leaves. Clamp one of the leaves face down on a stable work surface with one of the long edges hanging over the side. Rout the cove in the leaf with a few passes of a router and ½-inch-radius cove bit. Again,

CUTTING LIST

Part	Quantity	Dimension
A. Top	1	1⅛" × 17" × 56"
B. Leaves	2	1⅛" × 20" × 56"
C. Feet	2	1⅛" × 3¼" × 14"
D. Top supports	2	1⅛" × 3¼" × 14"
E. Gate rails	4	1⅛" × 3¼" × 29¾"
F. Legs	2	1⅛" × 7" × 24"
G. Gate stiles	4	1⅛" × 3½" × 24"
H. Top/middle/bottom crosspieces	3	1⅛" × 7" × 48"
I. Pivot dowels	4	½" dia. × 2⅛"

Hardware

4 #8 × 2-in. flathead wood screws
As needed, #10 × 2-in. roundhead wood screws
6 drop leaf table hinges

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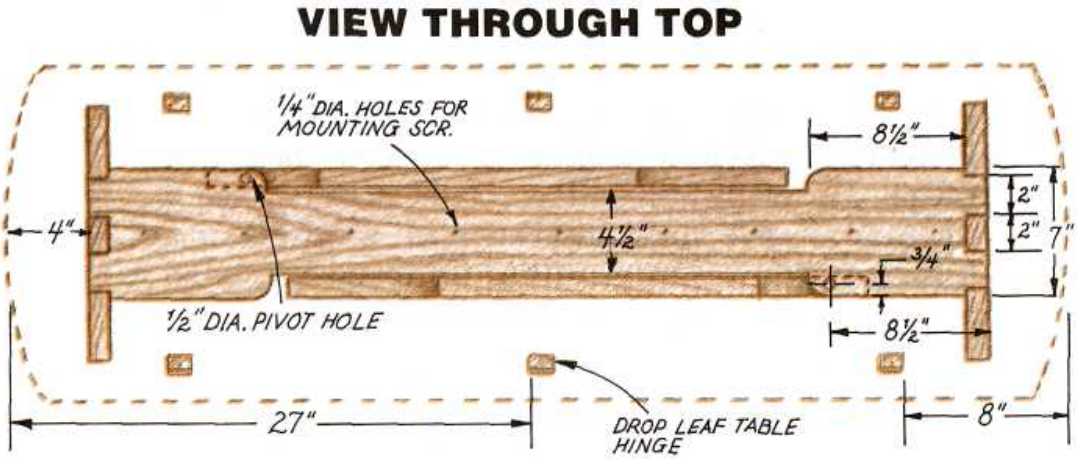
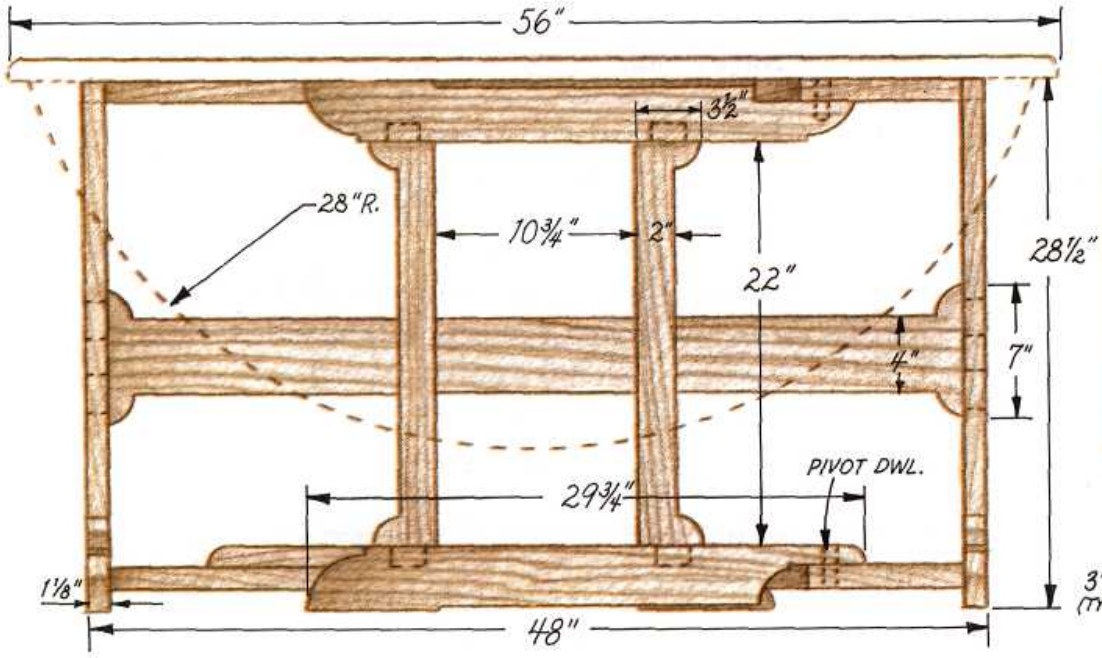
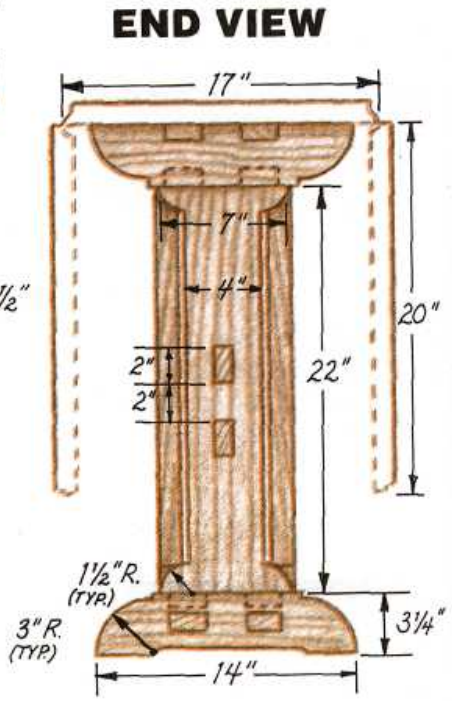
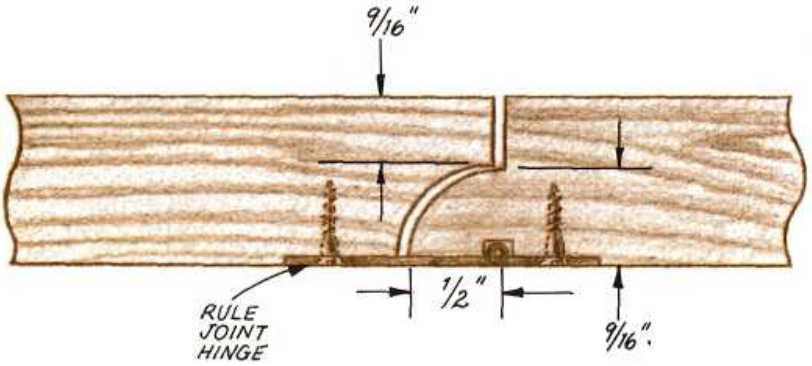




VIEW THROUGH LEAF





RULE JOINT DETAIL

lower the bit with each pass until you match the profile shown in the *Rule Joint Detail*. Repeat the process with the second leaf.

3 Hinge the leaves to the top. The leaves are hinged to the top with drop leaf table hinges. There are three hinges for each leaf, and mortises need to be cut for each. Each mortise also has a recess cut in it for the hinge barrels.

First, lay the top and leaves face down on a flat surface with the rule joints together. Separate the leaves from the top along the rule joint by 1/16 inch.

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Next, lay out the hinges along each rule joint, as shown in the *View through Top*. Position the hinges across the joint with the hinge barrel underneath the top, as shown in the *Rule Joint Detail.*

When all the hinges are in position, trace around each one with a marking knife and mark the position of the hinge barrel. Cut a mortise for each hinge to the depth of the hinge leaf. Remove most of the wood with a router and straight bit; clean up to the layout lines with a chisel.

After you cut the mortises, use a ¼-inch gouge to cut deeper mortises for the hinge barrels. The cuts need not be perfect: They will be hidden by the hinges.

When all of the hinge mortises have been cut, hinge the leaves to the top.

4 Lay out and cut the circular top. Plot the center point on the underside of the tabletop by drawing diagonal lines from corner to corner. The point at which the lines intersect should be the exact center of the tabletop. Lay out the 28-inch-radius circle on the top and leaves from the center point. Cut out the top with a jigsaw and sand the edge smooth.

SHOP TIP: Lay out the top with the help of a circle-marking stick. Make the stick from a 29-inch-long piece of scrap. Drill a ¼-inch hole at one end and a ⅛-inch hole 28 inches from the first hole at the other end. Drive a 6d finishing nail about ½ inch into the center point that you plotted on the underside of the table. Put the ⅛-inch hole at the end of the stick over the finishing nail and put a pencil in the ¼-inch hole at the other end. Swing the stick in an arc to make a perfect 28-inch-radius circle.

5 Cut out and mortise the feet, top supports, and gate rails. When you build the base of this table, you first build a trestle, and then add the gates that support the leaves. It's more efficient, however, to cut the joints for both trestle and gate at the same time.

First, lay out the foot, top support, and gate rail shapes on the stock, as shown in the *Foot Detail, Side View; Top Support Detail, Side View;* and *Gate Detail,* with a compass and straightedge. Notice that the rails on the top and bottom of the gate do not have the same shape.

Lay out the leg mortises on the top supports and feet. To cut the mortises, drill a series of adjoining holes inside the layout lines with a ½-inch drill bit. Cut up to the layout lines and square the mortise corners with a chisel.

Next, lay out and cut the through mortises in the feet for the crosspiece. Cut the mortises as before. When you clean up to the layout lines, work from both sides of the feet.

Notch the top supports to hold the top crosspiece. Lay out the notches and cut them in a series of cuts on the table saw.

Cut the foot, top support, and gate rail to shape with a band saw or jigsaw and sand off the marks left by the saw.

6 Tenon the legs and gate stiles and cut them to shape. Lay out the tenons on the legs and gate stiles, as shown in the *Tenon Details.*

Before you cut the tenons, set up the cut by putting a dado blade in the table saw. Adjust the dado blade so that it protrudes about ¼ inch above the surface of the table saw. Clamp a stop block to the fence to set the length of the tenons and

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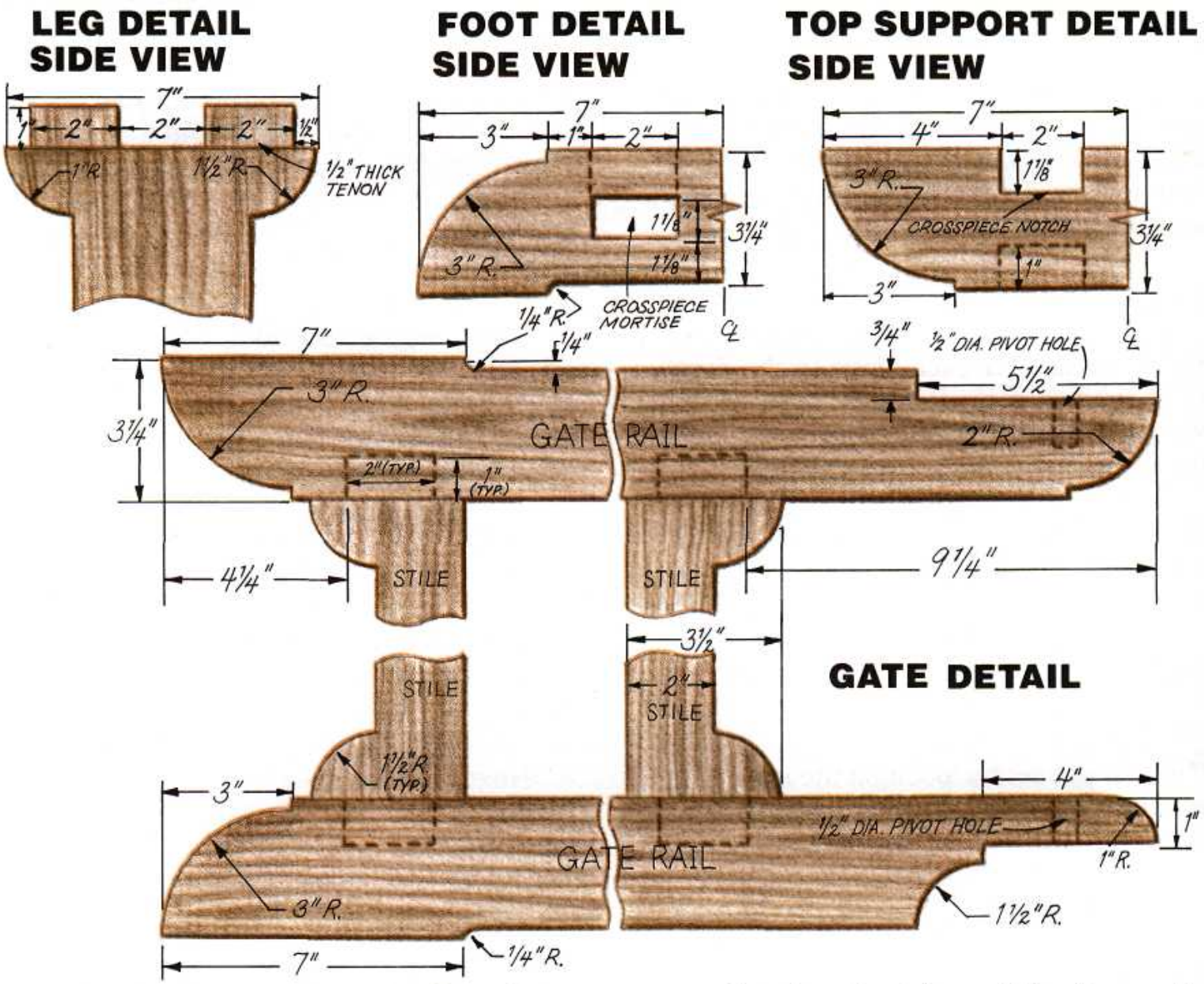

make the cut, as shown in *Tenoning on the Table Saw.* Test the setup on a piece of scrap the same thickness as the actual stock. Because the tenon is 1 inch long, you will have to cut each side of the tenon in two passes.

When you have cut one side of the tenon, flip the test piece over and make the cut on the other side. Then turn off the saw and test fit a corner of the tenon into a mortise. If it is too tight, raise the dado blade slightly and remove a little more stock from both sides of the tenon. When the test piece fits snugly, cut the thickness of the tenons in the legs and gate stiles with the same setup.

Cut the short face of the tenons by raising the dado blade ½ inch above the table and putting the stock on edge. Make the cuts as before.

Each leg has twin tenons on the top and bottom. Cut away a 2-inch section in the middle of the tenon you just cut, to create the twin tenons shown in the *Tenon Details.* Make the cuts that go with the grain with a backsaw. Cut across the grain with a coping saw. Keep the coping saw about 1/16 inch on the waste side of the layout line. Cut up to the line with a chisel.

When the tenons have been cut, cut the legs and gate stiles to shape. Sand away any saw marks.

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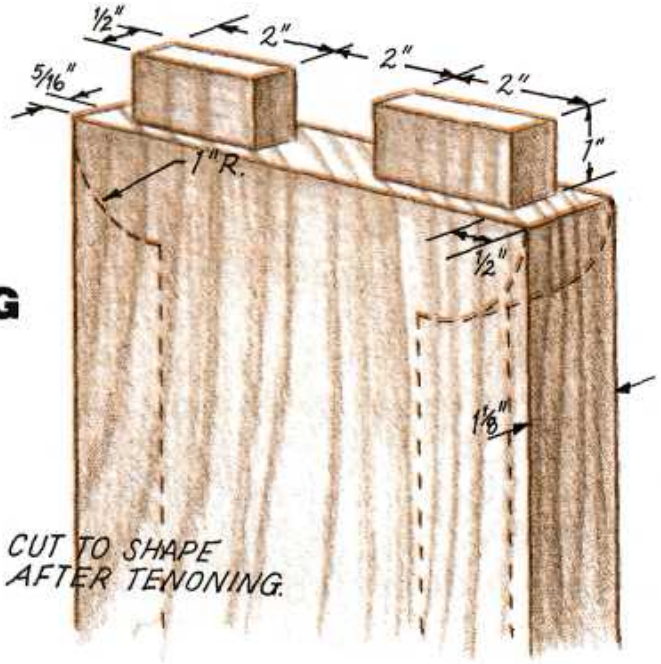
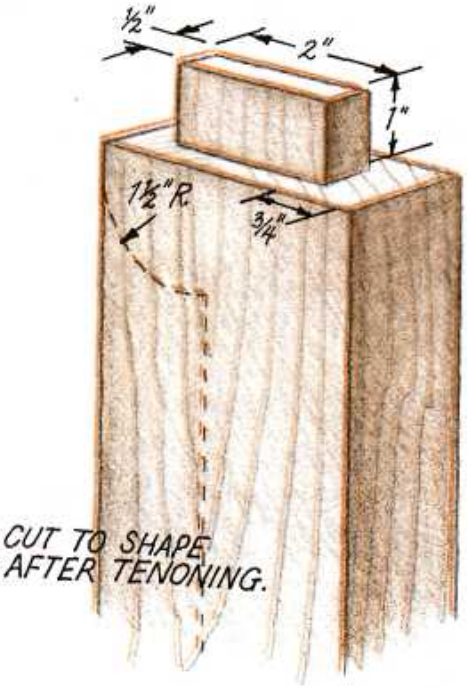
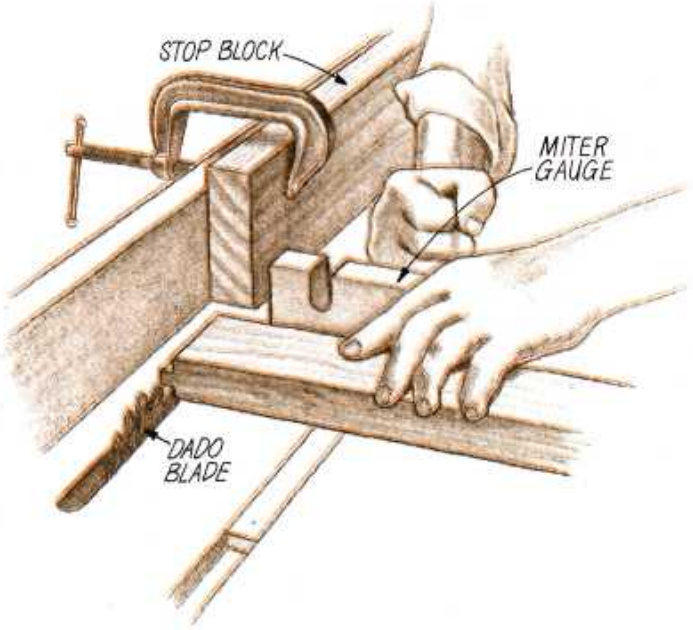


LEG



GATE STILE

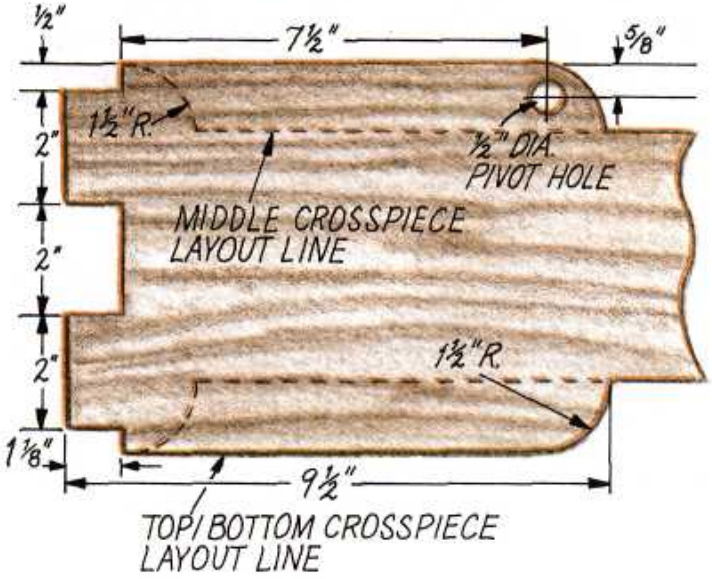
TENONING ON THE TABLE SAW



7 Tenon the crosspieces and cut them to shape. Lay out the crosspiece tenons, as shown in the *Crosspiece Detail*. Cut the tenons with a backsaw and remove the waste between them with a coping saw. Cut about 1/16 inch on the waste side of the layout lines with the coping saw as before. Clean up the cut with a chisel. Test the fit of the tenons in their mortises and make any necessary adjustments.

Cut the crosspieces to shape after you cut the tenons. Sand away any saw marks.

CROSSPIECE DETAIL



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8 Drill pivot holes in the gate rails and crosspieces. Lay out the pivot holes in the crosspieces, as shown in the *View through Top*. To ensure that the holes align, clamp the top and bottom crosspieces together and drill the holes in one operation.

Drill the holes in the gate rails, as shown in the *Gate Detail*.

9 Assemble the trestle. Coat the leg tenons with glue and put them in their mortises in the feet and top supports. Clamp the assemblies together and make sure that the assemblies are square. Allow the glue to dry.

When the glue is dry, add the crosspieces. Spread some glue on the crosspiece tenons and put them in their mortises. Make sure that you position the crosspieces so that the pivot holes are positioned as shown in the *View through Leaf*. Reinforce the joint in the top crosspiece by driving #8 × 2-inch screws through the tenons and into the top supports.

Clamp the crosspieces in place and allow the glue to dry.

10 Assemble the gates and attach them to the top and bottom supports. First, spread glue on the gate tenons and insert them into their mortises. Make sure the curves on the legs are positioned as shown in the *Gate Detail*. Clamp the gates together and make sure that they are square. Make any necessary adjustments and allow the glue to dry.

Next, position the gates on the base so that the pivot holes in the gates line up with those in the base. Insert the pivot dowels into the top crosspiece and tap them down into the top gate rails with a mallet.

Tap the remaining pivot dowels through the bottom gate rails and about halfway into the bottom crosspieces. This should leave about ½ inch of the pivot dowels exposed above the bottom gate rails. Spread a little glue on the exposed portion of the pivot dowels and tap them the rest of the way into the bottom crosspiece. Clean up any excess glue.

11 Attach the top to the completed base. Drill a series of evenly spaced holes in the crosspiece, as shown in the *View through Top*. Center the top on the base. Attach the top to the base by driving #10 × 2-inch roundhead wood screws through the holes and into the top.

12 Rout the profile around the top. When the top has been screwed to the base, pull up the leaves and swing out the gates to hold them. Rout the profile around the full circle of the top with a router and a ½-inch-radius roundover bit. As you cross the rule joint, be careful not to let the router bit bearing fall into the joint. Float from one edge of the joint to the other.

13 Apply the finish. Finish sand your gateleg table. Apply stain or a clear wood finishing oil to your table to bring out the beauty of the wood grain. Follow the stain or oil with a tough polyurethane to protect your table from everyday wear.

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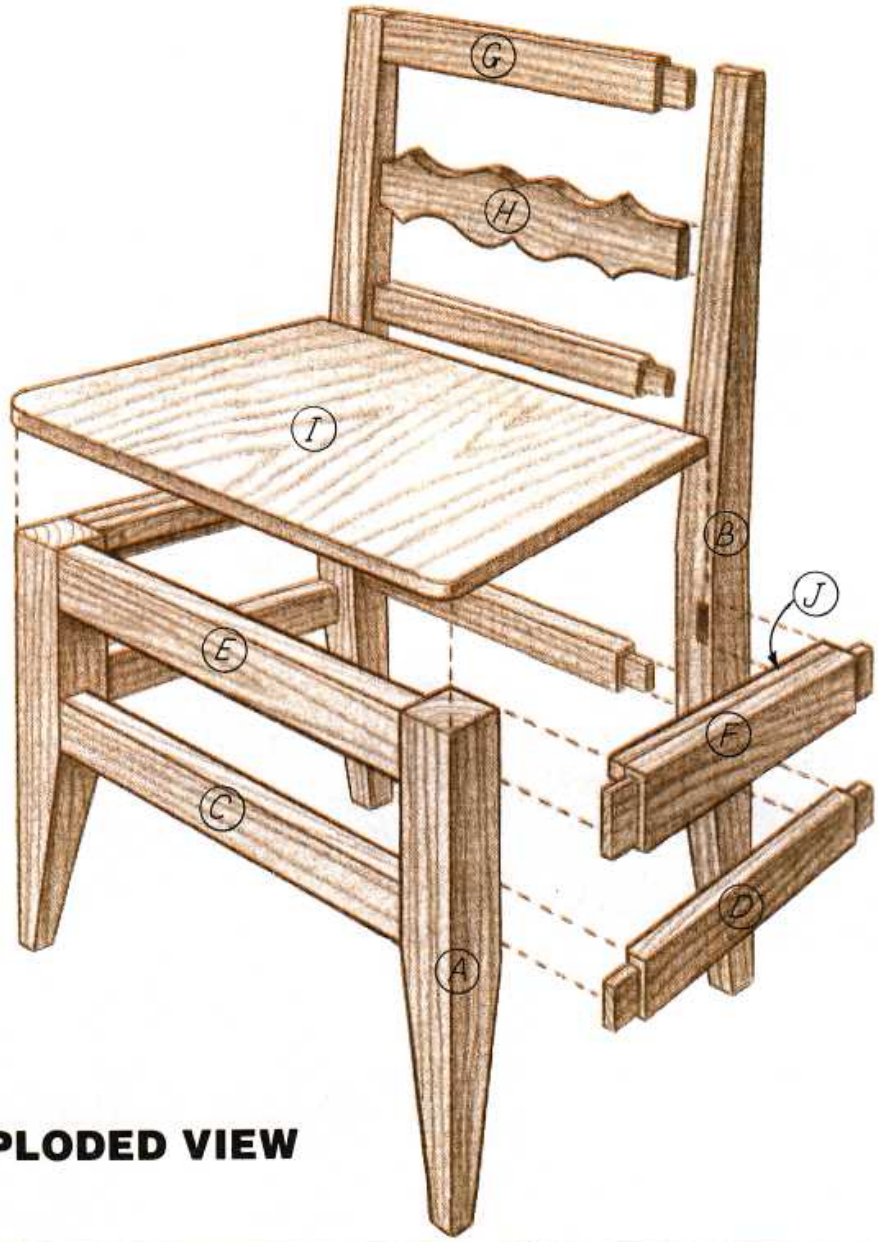
COUNTRY CHAIR



EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Front legs	2	1⅞" × 1⅞" × 15"	
B. Back legs	2	1¾" × 3" × 33½"	Cut to shape.
C. Front rail	1	⅞" × 1⅜" × 13³⁄₁₆"	
D. Side/back rails	3	⅞" × 1⅜" × 12⅞"	
E. Front support	1	⅞" × 1¾" × 13³⁄₁₆"	
F. Side supports	2	⅞" × 1¾" × 12⅞"	
G. Top rail	1	⅞" × 2" × 12⅞"	
H. Shaped rail	1	½" × 2½" × 12⅞"	
I. Seat	1	⁹⁄₁₆" × 16½" × 13¼"	
J. Cleats	2	¾" × ¾" × 10¾"	

Hardware

6 #8 × 1-in. flathead wood screws

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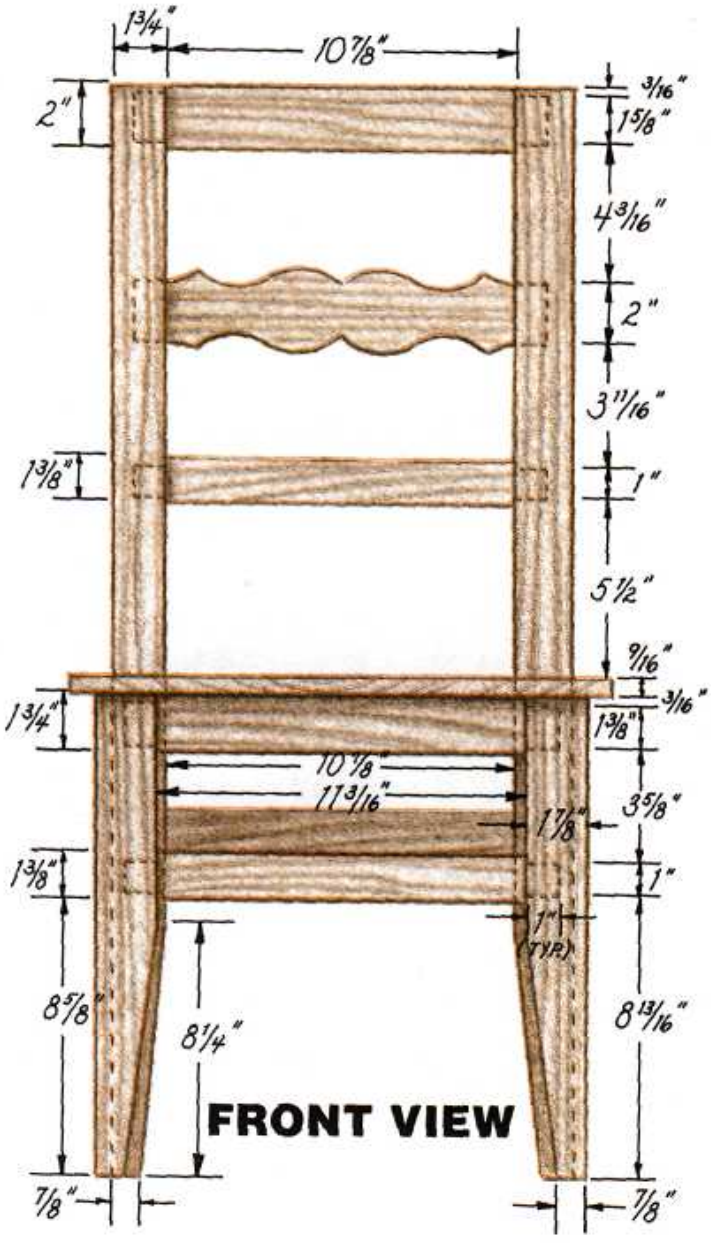
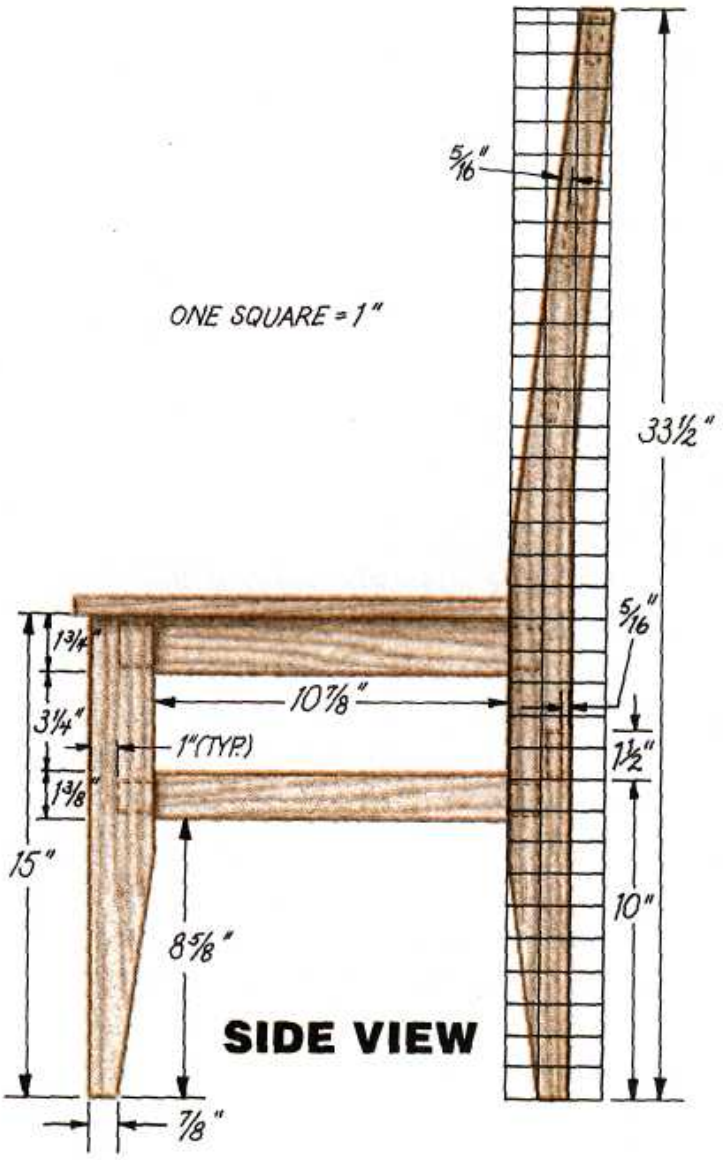
1 Select the stock and cut the parts. The chair shown is made from poplar. You could make your chair from other hardwoods like maple, cherry, or oak. Choose good straight stock that is free of knots and cut the parts to the sizes given in the Cutting List.

2 Cut the legs to shape. Draw a ½-inch grid on a 36-inch-long piece of paper and draw the back leg pattern onto it. Transfer the pattern to the stock and cut the back legs to shape on a band saw. Sand away any saw marks.

Each of the legs is tapered on two adjacent sides, as shown in the *Front View* and *Side View.* Cutting the back legs created one of the back leg's two tapers. Lay out the remaining taper on the back legs and lay out the tapers on the front legs. Cut the tapers on the band saw. Stay about 1/16 inch to the waste side of the layout lines as you cut and then trim down to the layout lines on a jointer or with a hand plane. Use a push stick on the jointer and keep your hands well away from the cutter.





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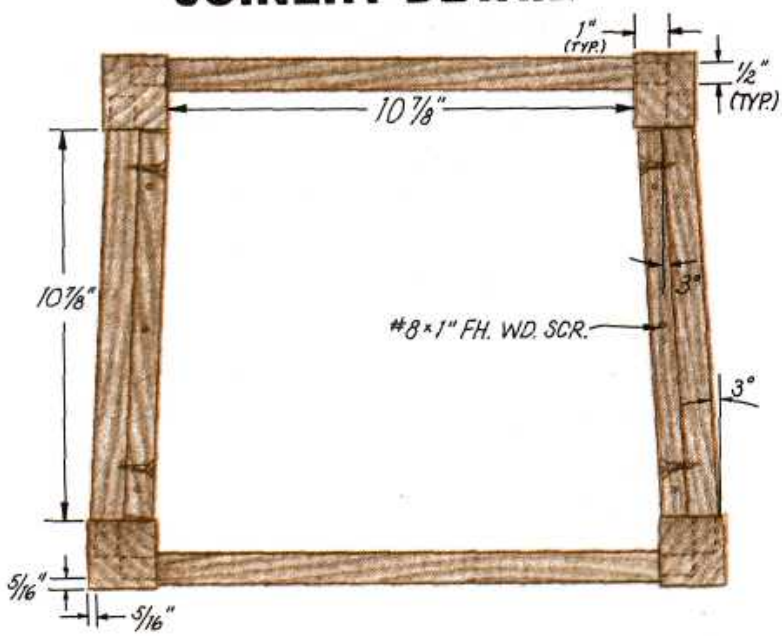
JOINERY DETAIL



3 **Cut the mortises in the legs.** All of the legs are mortised to accept the tenons in the rails and supports. Lay out the mortises shown in the *Joinery Detail, Front View,* and *Side View.* Cut the mortises by drilling a series of adjacent ½-inch holes between the layout lines. Cut the mortise sides and corners square with a chisel.

4 **Cut the tenons.** Making this chair requires both straight and angled tenons. Cut the straight tenons first.

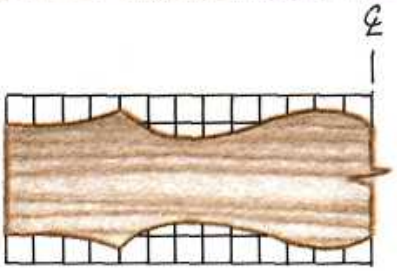
All of the straight tenons are 1 inch long and have 3/16-inch shoulders. Cut the tenons in repeated passes over the dado blade. To set up the cut, raise the dado blade 3/16 inch above the table. Test the setup on a piece of scrap the exact thickness of the rail. Cut one face of the test piece. Turn it over and cut the other face. Test fit the resulting tenon in the mortise. Adjust the blade height as necessary.

Adjust the fence so that guiding the end of the rail along it with the miter gauge cuts the tenon shoulder 1 inch from the end of the rail. To remove the remaining waste, reposition the rail in the miter gauge. Do not reset the fence. Cut the straight tenons.

5 **Cut the angled tenons.** Because the back of the chair frame is narrower than the front of the frame, the side rails and side supports run from front to back at an angle. To do this, you cut angled tenons on the pieces.

Lay out the tenons as shown in the *Joinery Detail.* Cut them as explained in "Angled Tenons" on page 138.

SHAPED RAIL PATTERN



ONE SQUARE = 1/2"

SEAT PATTERN

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6 Cut the shaped rail. The full thickness of this rail fits into the mortises you cut earlier. Slip a corner of the stock into the mortise to check the fit. Plane the stock to fit, if necessary. Draw a ¼-inch grid on a piece of paper and draw the *Shaped Rail Pattern* onto it. Transfer the pattern to the wood and cut out the shaped rail on a band saw. Sand away any saw marks.

7 Assemble the chair frame. First, assemble the two sides. Put some glue in the mortises for the side supports and side rails. Apply enough glue to coat the sides of the mortises, but don't apply so much that it squeezes out when you put the tenon in place. Put the rails and supports in the mortises, as shown in the *Exploded View.* Clamp each side together.

When the glue dries, test fit the rest of the chair and clamp it lightly together. If there are gaps between the front or back parts and the legs, you can correct them by trimming the rails and supports.

If the gaps are in front, correct them by trimming the rear rails and supports. If they are in the back, trim the front rails and supports. Trim the shoulders of one end of the appropriate rail and support by the amount of the gap.

To trim the shoulder on the table saw, put the piece in the miter gauge. Adjust the fence so that when you run the end of the stock against it, the blade will trim the necessary amount. Adjust the blade so that it won't cut into the tenon.

After you've done any necessary trimming, put glue in the remaining mortises, assemble the chair, and clamp it gently together.

8 Cut the seat to shape. Draw a ¼-inch grid on a piece of paper and draw the seat shape onto it, as grid in the *Seat Pattern.* Transfer the pattern to the wood and cut the seat to shape with a jigsaw or band saw. Sand the sawed edges smooth.

9 Attach the seat to the chair frame. The chair is attached to the frame with wooden cleats, as shown in the *Joinery Detail.* First, predrill clearance holes in the cleats that are slightly larger than the screw shank. Spacing of the holes isn't critical. Countersink the clearance holes. Screw and glue the cleats to the side supports, as shown. Then, center the seat on the frame and screw it in place. Do not glue the seat to the cleats or frame.

SHOP TIP: Drill the holes through the cleats with a combination pilot hole bit. These bits drill a countersink hole, a clearance hole for the screw shank, and a pilot hole for the screw threads in one operation. Pilot hole bits are available at most hardware stores and are sold according to the screw size.

10 Sand and apply the finish. Finish sand your chair. Paint or stain and varnish your chair to match your decor. Tack a colorful quilted pad to the seat for a homey, country look.

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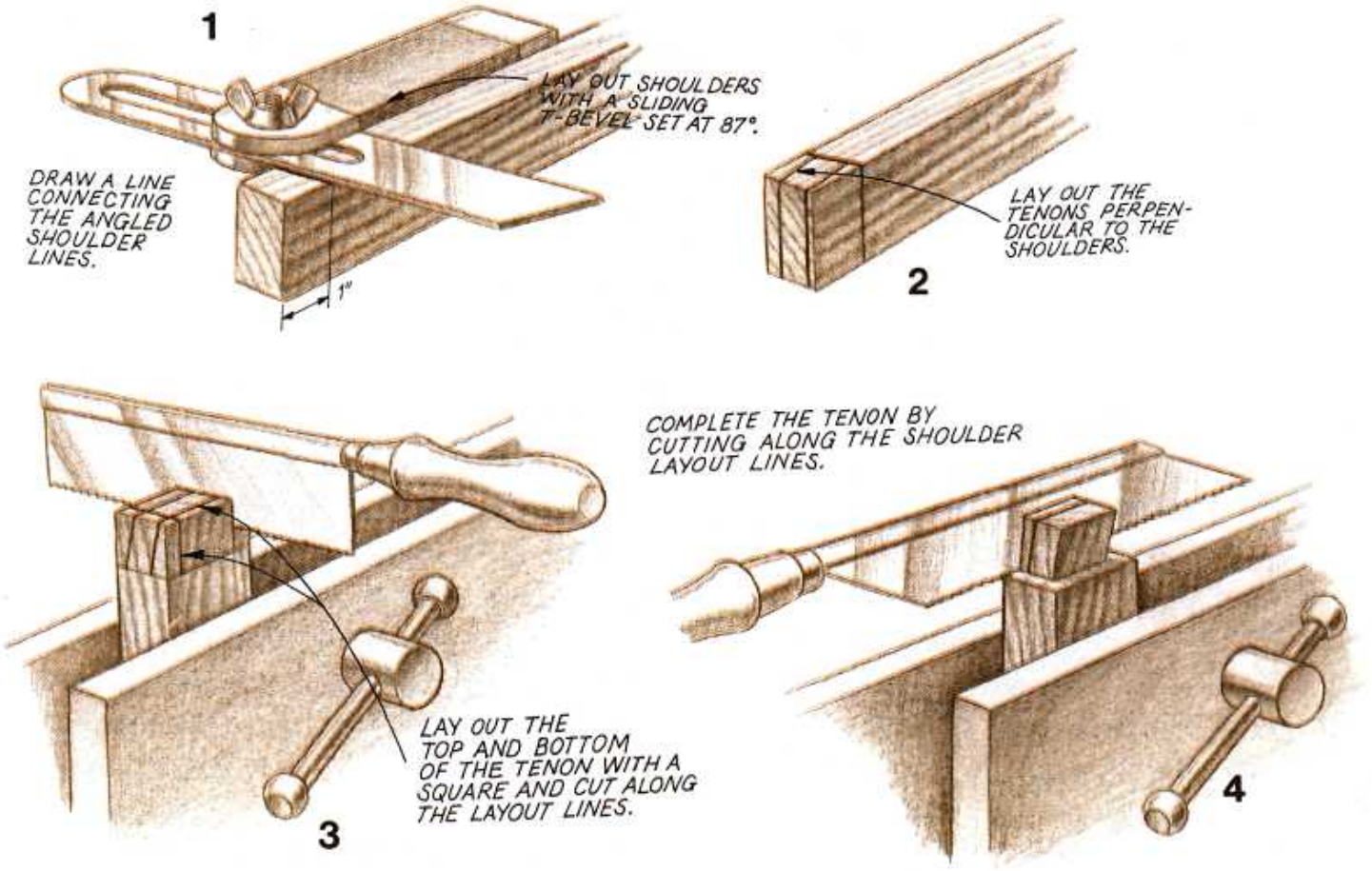
ANGLED TENONS



1 Lay out the shoulders. Set a sliding T-bevel to the angle of the tenon shoulders—87 degrees in this case. Guide a pencil along the blade of the T-bevel to mark the shoulders on the top and bottom of the stock. These lines are directly above one another and parallel. With a square as a guide, draw lines connecting the shoulder lines.

2 Lay out the angled tenons. With the T-bevel still set at 87 degrees, lay out the tenon. First mark the base of the tenon along the shoulder lines—3/16 inch from the edges in this case. Use the T-bevel to draw lines from the base of the tenon to the end of the rail, as shown. The tenons are perpendicular to the angled shoulder lines.

3 Lay out the top and bottom of the tenon and cut along the layout lines. Lay out the top and bottom of the tenon—3/16 inch from the top and bottom edges of the board in this case. Cut along the layout lines down to the shoulder lines on all four sides of the tenon. A backsaw or dovetail saw will work best for these precise cuts. Be careful to follow the angles while cutting.

4 Complete the tenon. Cut carefully along the shoulder lines and remove the waste. Test fit the tenon and adjust the tenon width and thickness with a chisel if necessary.

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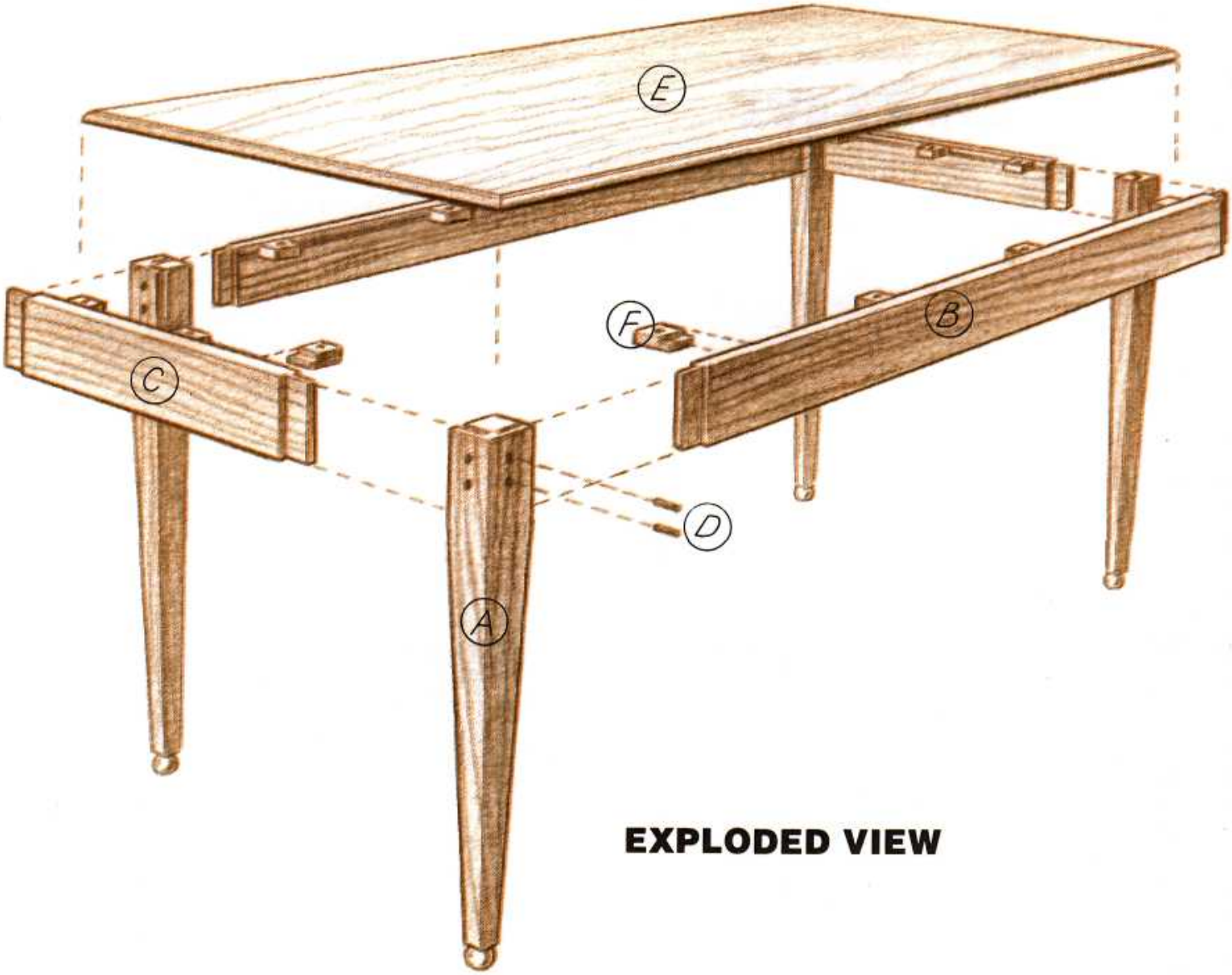
FARM TABLE



EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Legs	4	1½″ × 1½″ × 29″	
B. Side aprons	2	¾″ × 4½″ × 46½″	
C. End aprons	2	¾″ × 4½″ × 22″	
D. Dowel pins	16	¼″ dia. × ¾″	
E. Tabletop	1	¾″ × 27″ × 51½″	Glue up from narrower boards.
F. Clip	1	¾″ × 2″ × 25″	Makes 14

Hardware

14 #10 × 1¼-in. flathead wood screws

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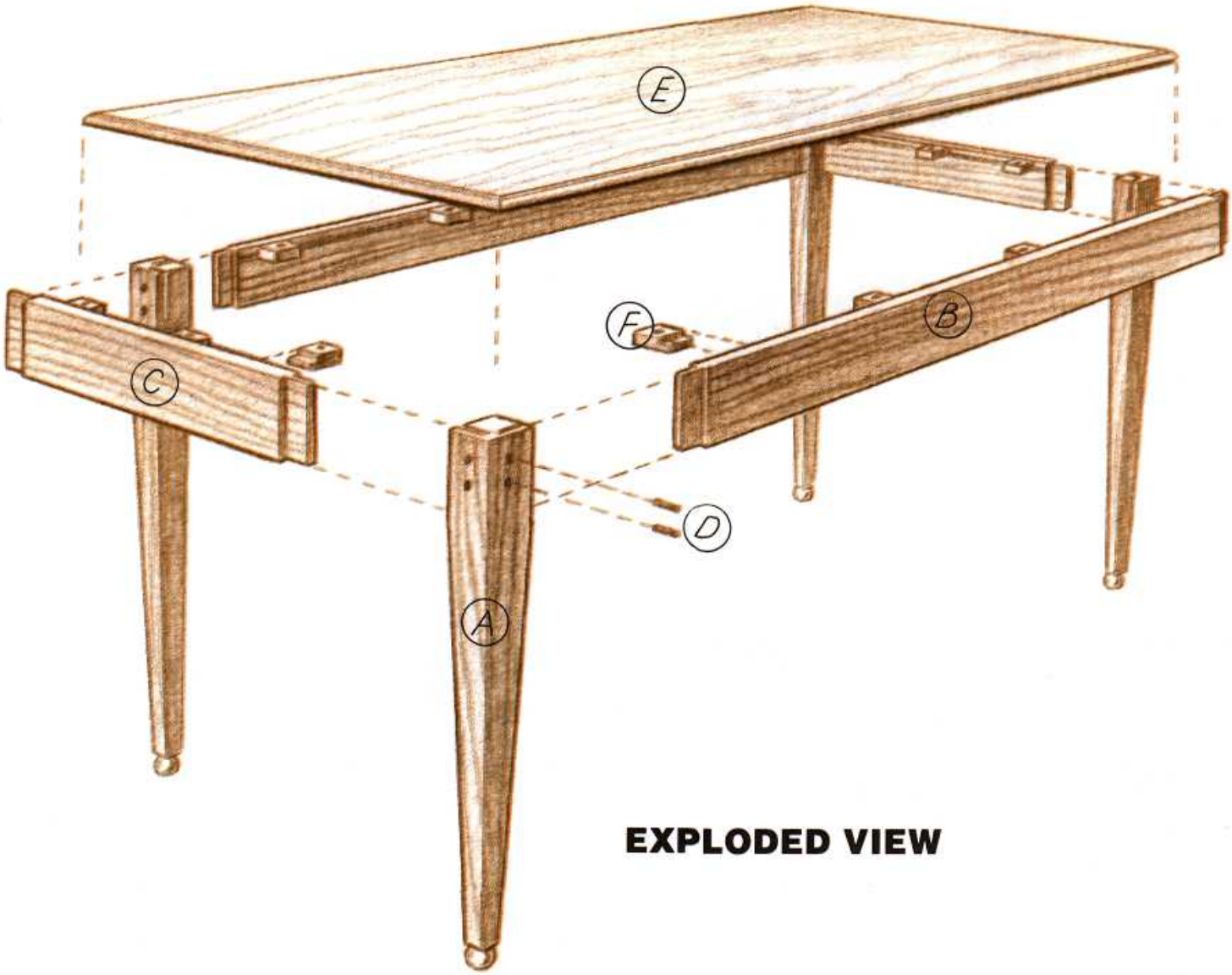

EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Legs	4	1½" × 1½" × 29"	
B. Side aprons	2	¾" × 4½" × 46½"	
C. End aprons	2	¾" × 4½" × 22"	
D. Dowel pins	16	¼" dia. × ¾"	
E. Tabletop	1	¾" × 27" × 51½"	Glue up from narrower boards.
F. Clip	1	¾" × 2" × 25"	Makes 14

Hardware

14 #10 × 1¼-in. flathead wood screws

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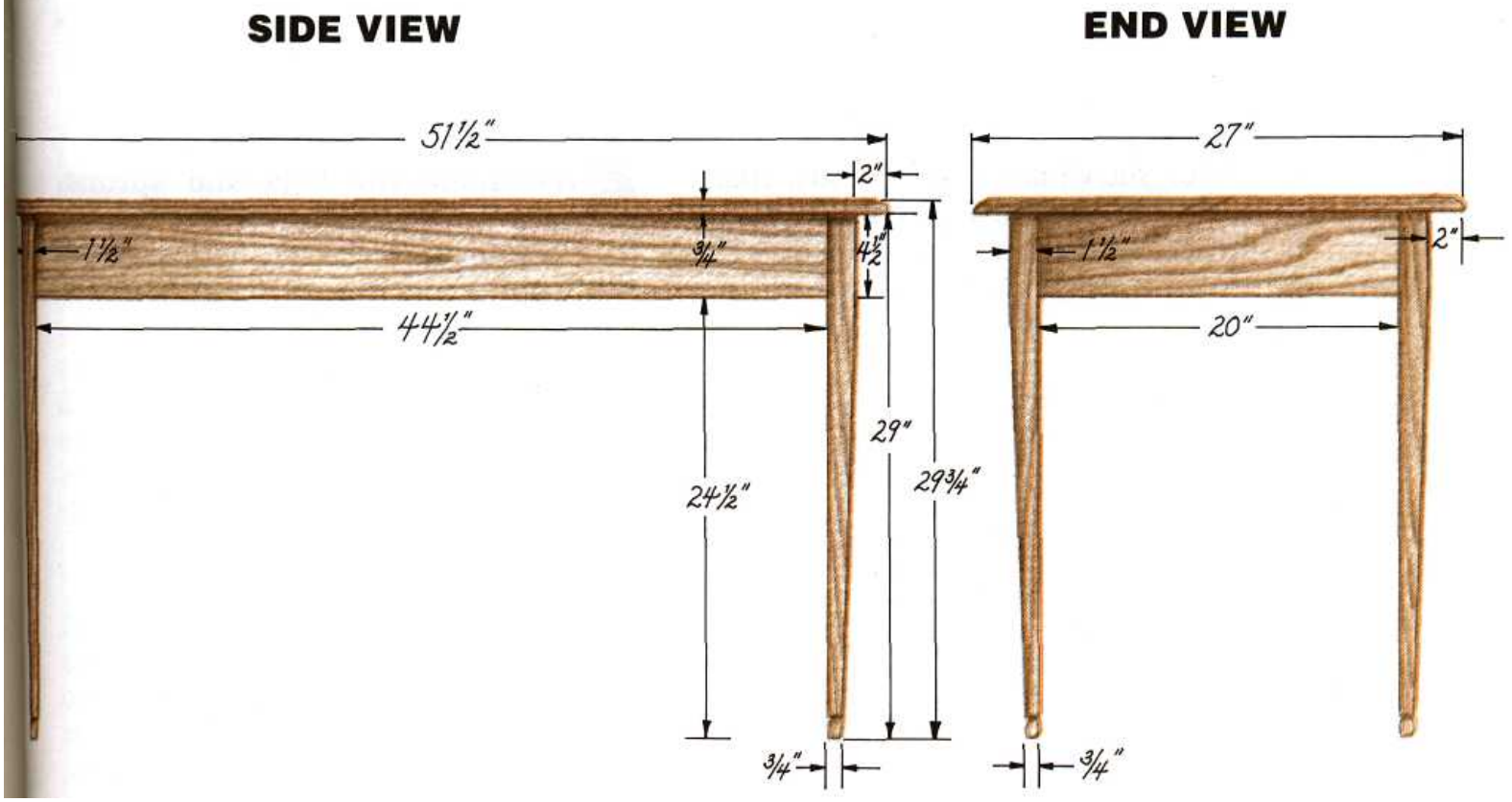
1 Select the stock and cut the parts. Look for straight, flat hardwood stock, without knots. Try to find lengths with interesting grain patterns. Joint, plane, rip, and cut the legs and aprons to the sizes given in the Cutting List.

2 Cut the mortises in the legs. The legs and aprons are joined by mortise and tenons, as shown in the *Joinery Detail.* One end of the mortise is open—it comes through the top of the leg. You can make these mortises with a table-mounted router. If you use a router, make sure your bit is long enough to cut a 1-inch-deep groove.

To cut the mortises, you must use two different fence settings. First, put a ¼-inch straight bit in the router. Set up the router to cut a 1-inch-deep groove, ¼ inch from the fence. Cut one mortise in each leg. Then reset the fence so it is 1 inch from the bit. Cut the second mortise on each leg.

SHOP TIP: Clamp a block of wood to the fence 4¼ inches beyond the cutter. When the leg hits the block, the mortise is the correct length.



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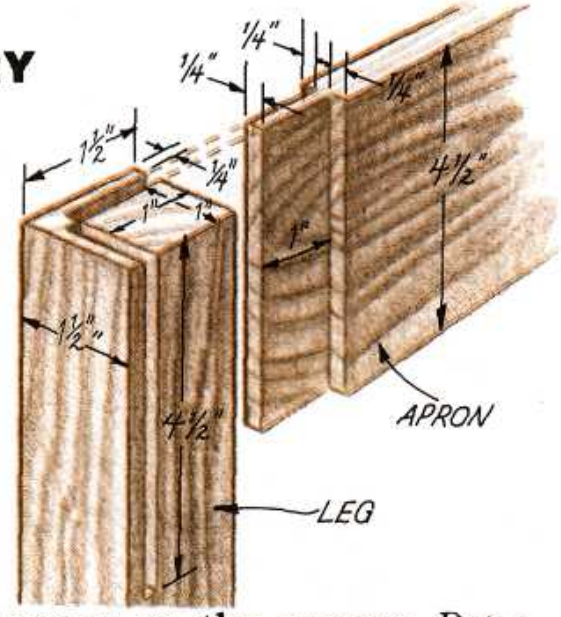
JOINERY DETAIL



3 Cut tenons on the aprons. Put a dado blade, set to cut ¾ inch wide, in the table saw. Position the fence ¼ inch away from the cutter and adjust the blade to make a cut ¼ inch deep.

Cut each side of the tenon in two passes. First, use the miter gauge to guide the cut along the fence. On the second pass, adjust the position of the board against the miter gauge so that the cut removes the rest of waste. Turn the board over and repeat.

After you've cut all the tenons, rout a ⅜ × ⅜-inch groove in the inside face, ⅜ inch below the top edge, as shown in the *Fastener Detail.* The wooden clips that attach the tabletop will fit into these grooves.

SHOP TIP: If the shoulders of your tenons don't align with each other, check the setup on the saw. Measure to make sure the fence is parallel to the blade. Check the miter gauge to make sure it really is set at 90 degrees. Cut a few test tenons on some scrap, until you're sure of your setup.

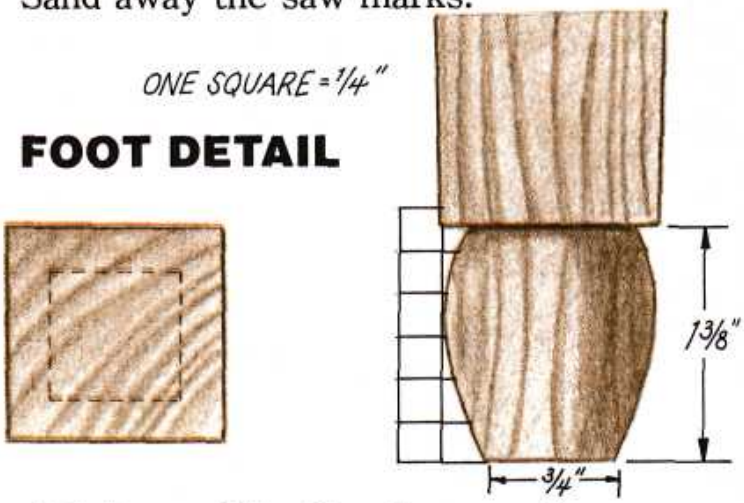
4 Taper the legs. After you have cut and fitted all of the mortises and tenons, lay out the taper of the legs. You can cut out the tapers on the band saw or cut them on the table saw, as explained in "Table Saw Tapers" on opposite page.

After you've tapered the legs, lay out and chamfer the edges of the tapers. Put a chamfer bit in a router. Secure the router in a router table and cut the chamfers. Stop the chamfers 4½ inches from the top of the legs to allow for the aprons.

When the chamfers have been cut, use a band saw to cut the shape shown in the *Foot Detail* in the ends of the legs. Sand away the saw marks.

ONE SQUARE = 1/4"

FOOT DETAIL



5 Assemble the legs and aprons. Sand the legs and aprons and test the fit of the joints. Make any necessary adjustments. Apply glue and clamp the legs and aprons.

After the glue has set and the clamps are removed, cut two dowel pins for each mortise. Drill ¾-inch-deep stopped holes in the legs and tenons. Drive a glue-coated dowel into each hole. Sand the dowels flush.

6 Glue up the tabletop. Joint, plane, rip, and cut boards to make up the tabletop stock. How many boards you need to cut depends, of course, on their widths; simply cut enough pieces to form the size given in the Cutting List.

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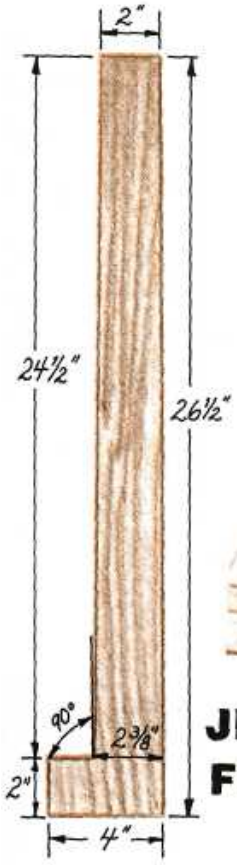
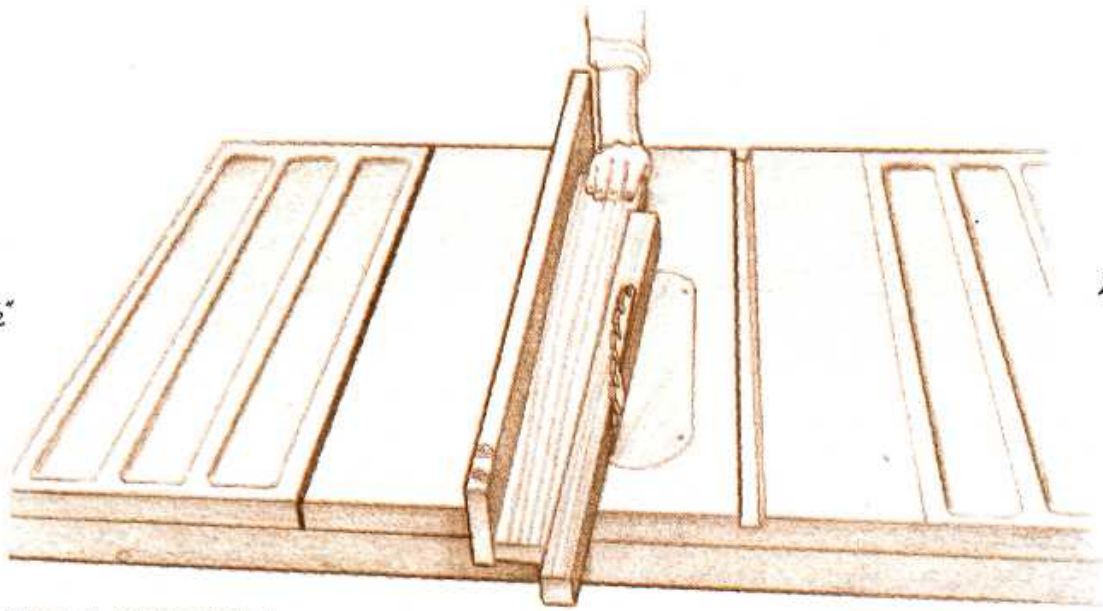
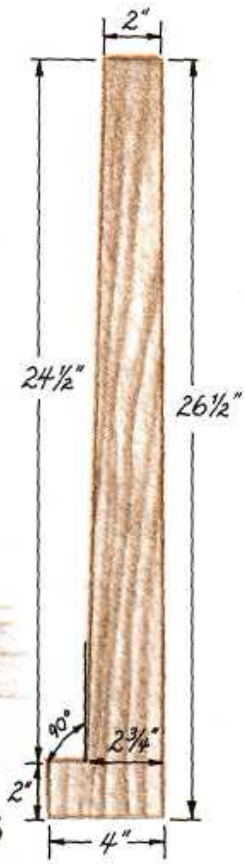
TABLE SAW TAPERS



JIG LAYOUT, FIRST TAPERS





JIG LAYOUT, SECOND TAPERS

1 Lay out the jig. A shop-made jig makes quick work of tapering legs on the table saw. Lay out the jig, as shown, on a piece of ¾-inch plywood. Cut it to shape with a band saw or jigsaw. Because the legs for this project are tapered on all four sides, you need to make two jigs. The first jig cuts a taper on two adjoining sides. The second jig cuts the taper on the remaining sides.

To lay out a taper other than the one shown here, draw the leg full size on a piece of plywood. Draw it so that a long edge of the leg is along the long edge of the plywood. Cut out the profile of the leg to make the jig.

2 Set the rip fence. Fit the leg into the first jig with the bottom of the leg against the foot of the jig. With the saw off, slide the straight side of the jig along the rip fence. Adjust the fence so that the saw blade first meets the leg at the beginning of the taper.

3 Cut the first taper. Guide the jig along the fence to cut the first taper. Then turn the leg a quarter turn and cut the adjacent face. Set the leg aside and make the same two cuts on the remaining legs.

4 Cut the second taper. Switch to the second jig and repeat the process, cutting the untapered faces.

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Arrange the pieces with their most attractive faces up and in a sequence that yields the best appearance, then glue them together. After the glue sets, remove the clamps and sand the top.

Finally, put a ½-inch roundover bit in a router and rout the edges of top to the profile shown.

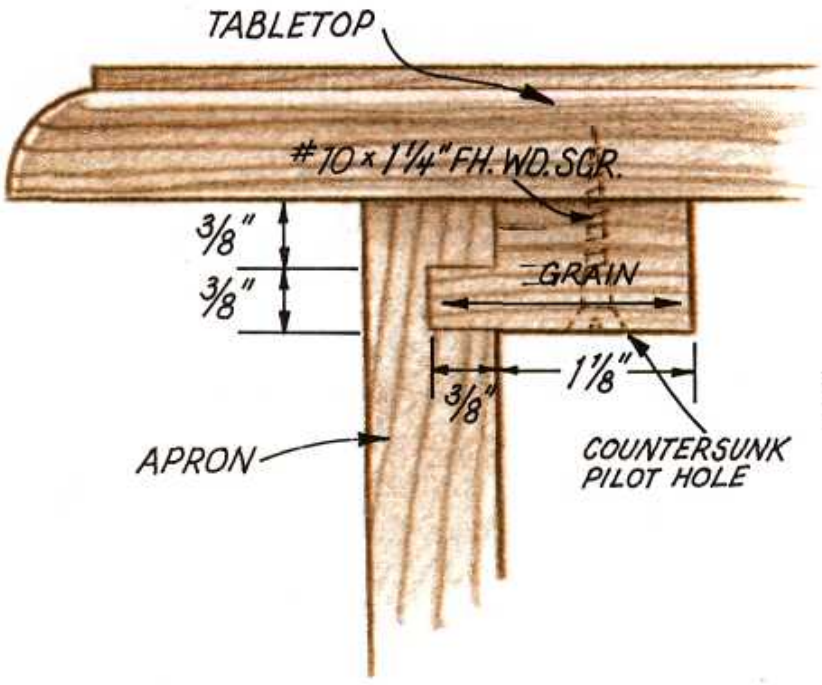
7 Attach the tabletop to the frame. The tabletop is attached to the aprons with wooden clips, as shown in the *Fastener Detail.* As the tabletop expands and contracts with changes in humidity, the fasteners slide in their grooves.

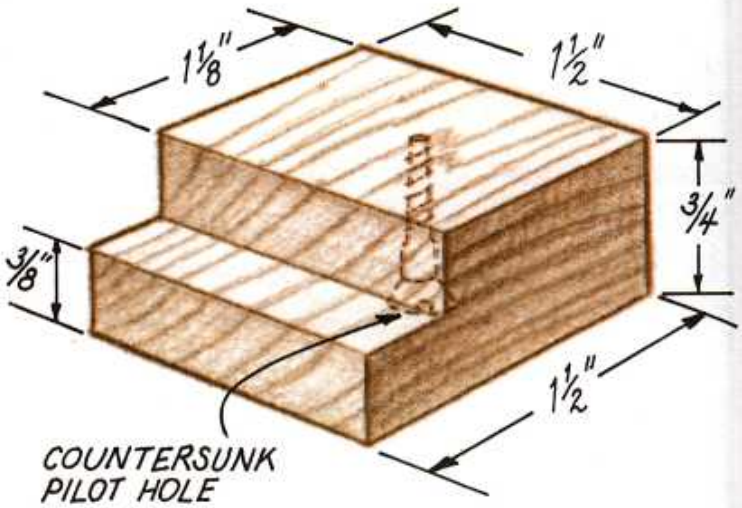
To make the clips, cut a ⅜ × ⅜-inch rabbet in a ¾-inch-thick board. Note the grain direction in the *Fastener Detail.* Rip a 1½-inch-wide strip from the board, then crosscut the board into 1½-inch squares.

Attach the top to the leg and apron assembly with the clips and flathead wood screws. Evenly space three clips along each end and four along each side.

8 Apply finish. Do any necessary touch up sanding, then apply a finish to the table. To help keep the tabletop from warping, be sure you finish the bottom as well as the top.

FASTENER DETAIL





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CHILD'S BENCH

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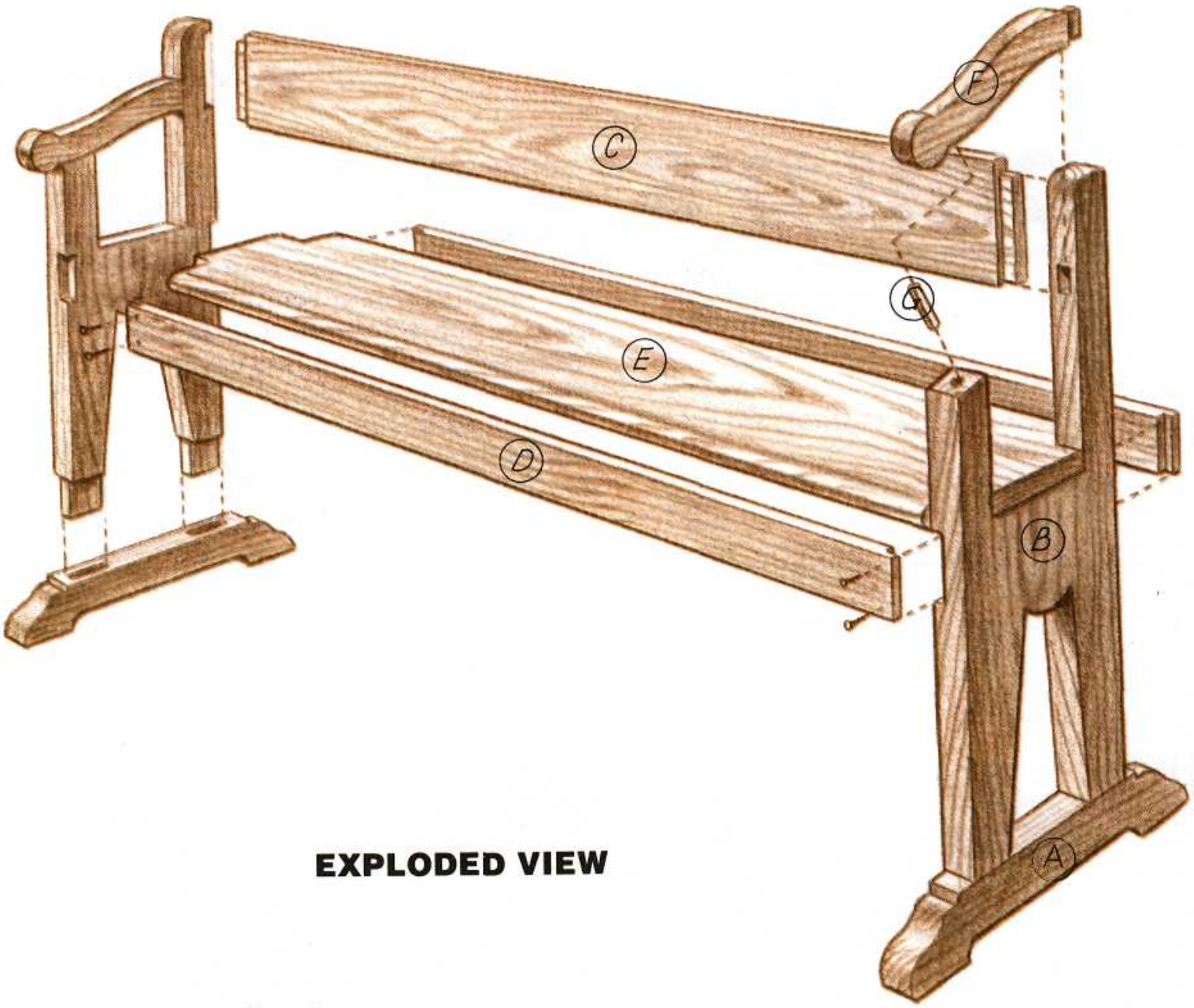

EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension
A. Feet	2	1 9/16″ × 2 3/4″ × 15″
B. Bench ends	2	1 3/8″ × 7 3/4″ × 26 3/4″
C. Back	1	7/8″ × 5 3/4″ × 40 5/8″
D. Seat supports	2	7/8″ × 2 3/4″ × 40 5/8″
E. Seat	1	7/8″ × 9″ × 43″
F. Arms	2	1 3/8″ × 2″ × 9 5/8″
G. Dowels	2	1/2″ dia. × 1 3/4″

Hardware

2 #10 × 1 3/4-in. flathead wood screws
12 #10 × 1 1/2-in. flathead wood screws

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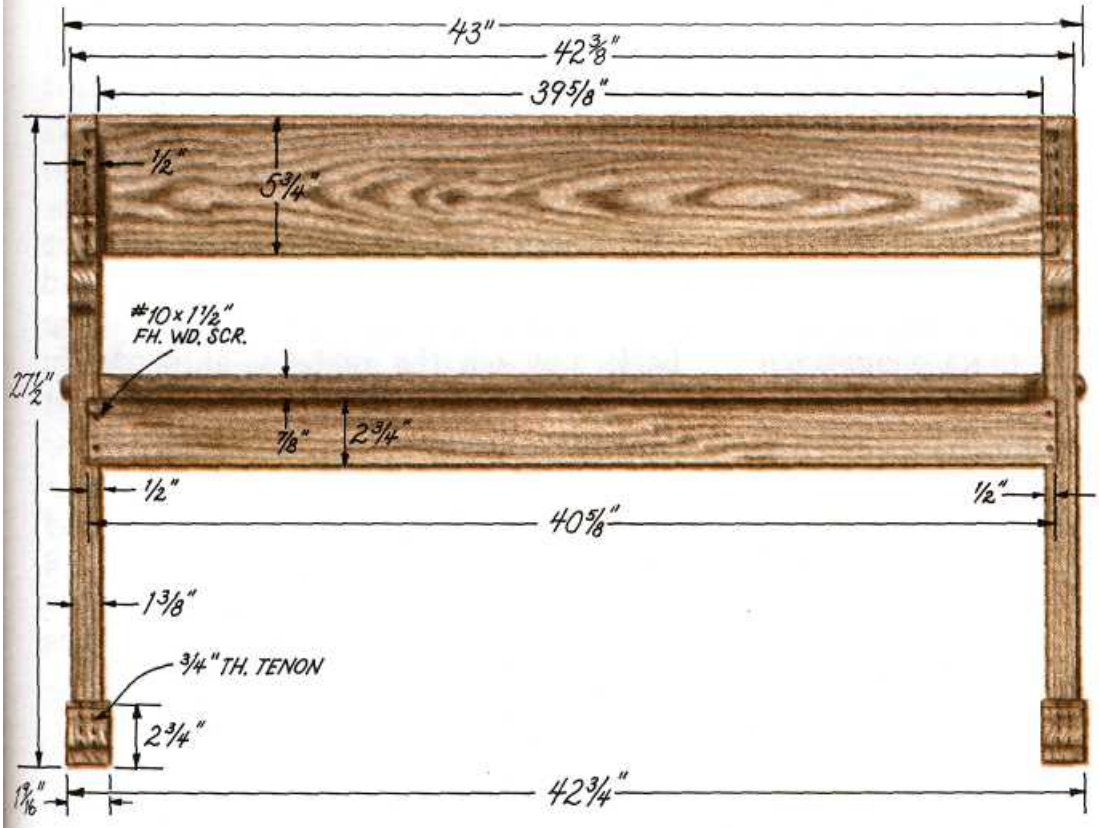
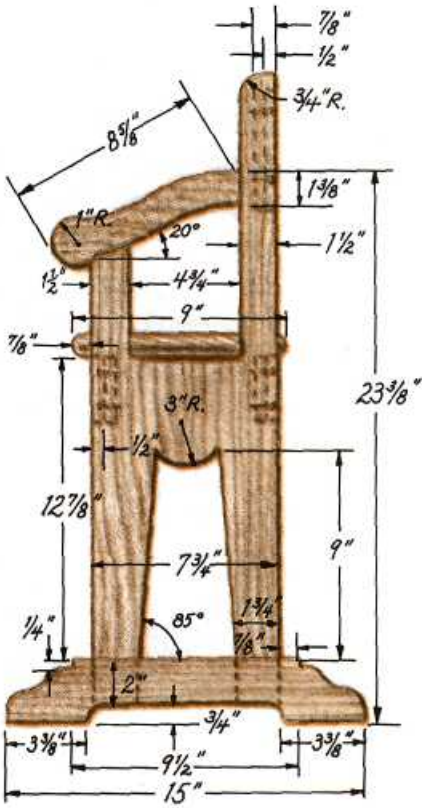
1 Select the stock and cut the parts. Joint, plane, rip, and cut the parts to the sizes given in the Cutting List. If necessary, glue up boards to get the wider pieces.

2 Mortise the feet. Lay out the foot mortises with a sharp pencil. A plunge router with a ¾-inch straight bit and fence can cut theses mortises easily and cleanly. Clamp both foot blanks side by side in a vise with the tops flush. The two feet provide plenty of bearing surface for your router base. Adjust the fence so the bit is centered over the mortise. Rout the mortise in several passes, lowering the bit about ¼ inch with each pass. If you do not have a plunge router, drill a series of adjacent ½-inch holes inside the layout lines. Cut along the layout lines with a sharp chisel to create the mortise.

3 Shape the foot. Draw a ¼-inch grid on a piece of paper and enlarge the *Foot Pattern* onto it. Transfer the pattern to the foot stock and cut out the shape on the band saw. Remove the band saw marks with a small-diameter sanding sleeve chucked in the drill press and by hand with files and sandpaper.



FRONT VIEW



SIDE VIEW

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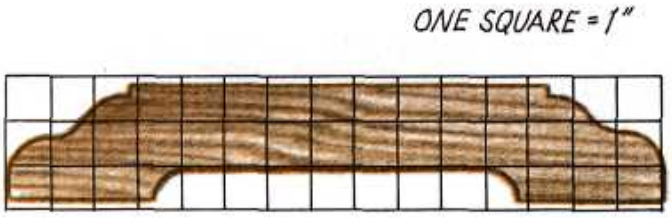
FOOT PATTERN



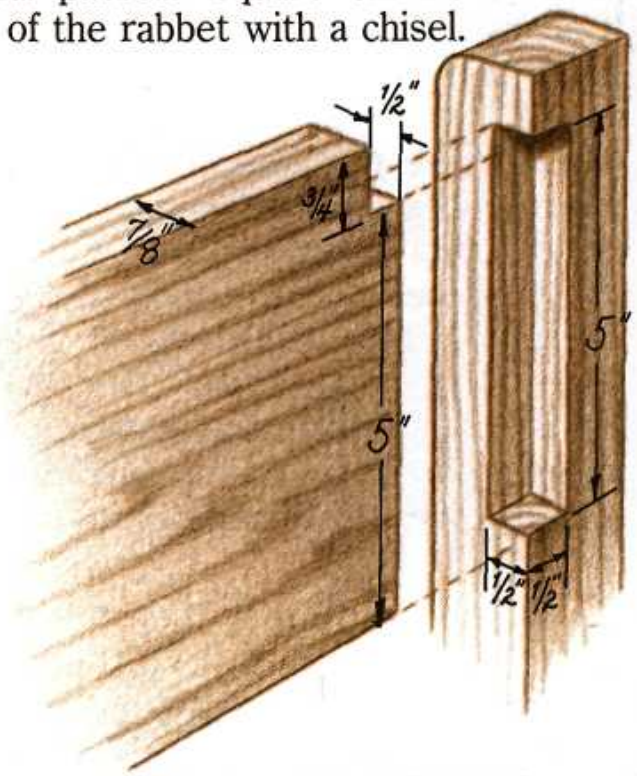
4 Tenon the bench end. Cut all the joints in the bench end *before* you shape it. First, cut one long tenon across the bottom of the side. Put a dado blade in the table saw and raise the blade to make a 5/16-inch cut. Set the rip fence so that when you run the end of the board against it, it cuts a shoulder 2 inches from the end.

Check the setup by cutting a tenon on a sample piece 1 3/8 inches thick. Put the scrap in the miter gauge, with the end of the scrap against the fence. Guide the sample across the saw blade with the miter gauge. Make several cuts, repositioning the sample in the miter gauge each time, until you've removed all the waste between the shoulder and the end of the sample.

Flip the board over and repeat. Test the fit of the tenon in the foot mortise and make any necessary adjustments to the setup.

Cut a tenon along the entire bottom of the bench ends.

5 Rabbet for the back. A tongue on the back fits into a rabbet in the bench end, as shown in the *Back Joinery Detail.* Mark what will be the two inside surfaces of the ends and lay out the rabbets on these surfaces. Put a ½-inch rabbeting bit in the router and adjust the router to cut a ½ × ½-inch rabbet. Rout the rabbet in several passes. Square off the rounded ends of the rabbet with a chisel.



BACK JOINERY DETAIL

6 Rabbet for the seat supports. The seat supports also have tongues and fit in rabbets similar to the ones for the back. Lay out the rabbets, as shown in the *Front View* and *Side View,* and rout them as before.

7 Cut the bench end to shape. Lay out the legs, arm supports, and back supports on the bench ends, following the dimensions in the *Side View.* Cut the ends to shape with a jigsaw or band saw. Plane, scrape, and sand away the saw marks.

8 Attach the feet. Test fit the bench ends and feet. Make any necessary adjustments and glue them together.

9 Cut tongues on the back and seat supports. Set up the table saw,

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dado blade, and rip fence to cut tenons. Raise the dado blade to remove 3/8 inch of stock; set the rip fence so that guiding the end of the board along it will cut away 1/2 inch of stock. Cut a tongue on the end of each piece, as shown in the *Back Joinery Detail.* With a backsaw, cut away part of the tongue on the back board, as seen in the *Front View.*

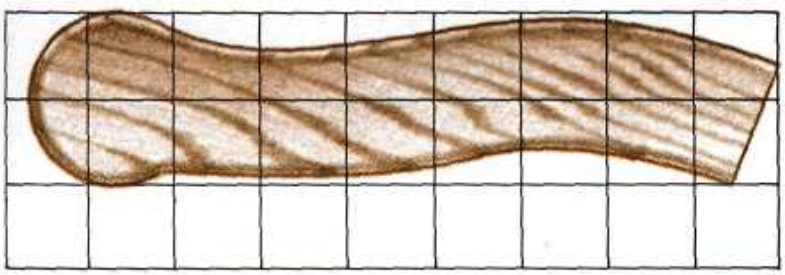
Clamp the seat supports and back in place with C-clamps. With a pilot hole bit, predrill two evenly spaced holes through the end of each part for #10 × 1½-inch screws. Screw the back and seat supports in place.

10 **Shape the seat.** Notch the front and back of the seat so that it will fit between the arm support and the back rest. With a compass, lay out a 7/8-inch radius on the front corners. Cut the radius on the band saw and sand any saw marks smooth. Rout a 3/8-inch roundover on the front and back of the seat.

11 **Make the arm.** Draw a ½-inch grid on a piece of paper and draw the *Arm Pattern* onto it. Transfer the pattern to the stock and cut the arm to shape on the band saw. Clean up the curved edges on a stationary belt sander or sanding sleeve in the drill press.

ARM PATTERN

ONE SQUARE = 1"



12 **Attach the arms.** The arms are attached to the arm supports with ½-inch-diameter dowels. First, drill the holes in the arm supports with the help of a doweling jig. For holes that are properly angled, position the jig so that there are no gaps between the jig and the end grain.

Put ½-inch dowel centers in the holes you've just drilled and position the arms on the bench. Push the arms firmly into the dowel centers; the points will make marks at the center of the dowel holes in the arms. Drill the holes with the help of a doweling jig as before.

The arms are screwed to the back of the chair. Put the arms and dowels in place. Hold the arms in place as you predrill through the back and into the arms with a 1/8-inch drill bit. Remove the arms and enlarge the holes in the back support with a 3/16-inch drill bit. Countersink for a #10 screw.

Dowel and glue the arms to the arm supports; screw the arms to the back with #10 × 1¾-inch screws.

13 **Apply the finish.** The bench in the picture is finished with a spar varnish. A painted bench would have more of a country look.

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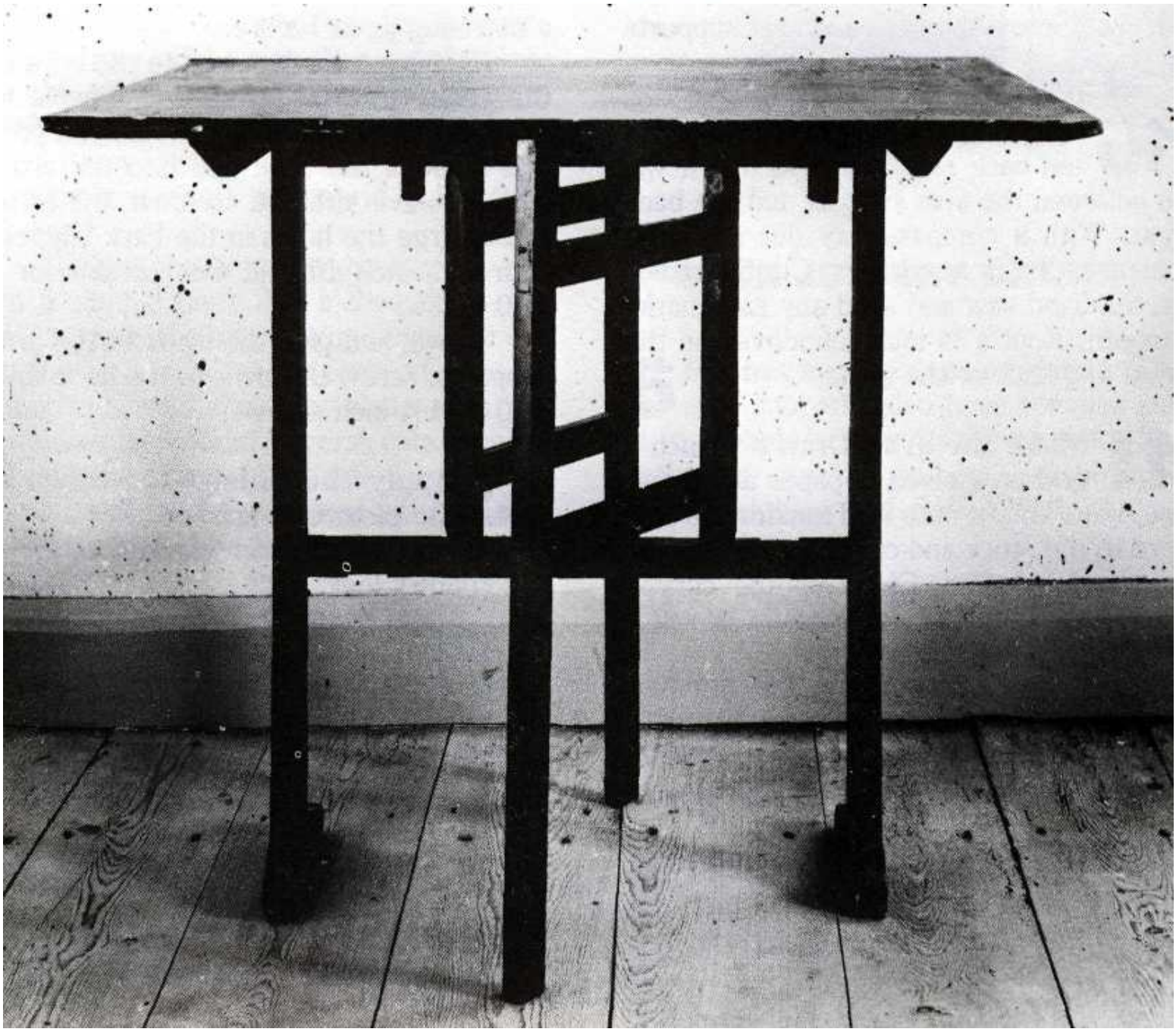
TILT TOP TABLE



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EXPLODED VIEW

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CUTTING LIST

Part	Quantity	Dimension	Comment
A. Top	1	¾″ × 35″ × 35″	
B. Legs	2	¾″ × 1½″ × 29¾″	
C. Pivot posts	2	¾″ × 1½″ × 14″	
D. Feet	2	1¼″ × 2″ × 11″	
E. Posts	2	1¼″ × 2″ × 28 11/16″	
F. Bottom trestle	1	1¼″ × 2″ × 23″	
G. Stretchers	4	¾″ × 1½″ × 13½″	
H. Top trestle	1	1¼″ × 2″ × 23″	
I. Pivot dowel stock	1	½″ dia. × 10″	Makes 6
J. Pivot support	1	1 1/16″ × 2½″ × 23″	
K. Battens	2	1¼″ × 1½″ × 32″	

Hardware

As needed, #10 × 2-in. roundhead wood screws
As needed, ⅜-in.-dia. flat washers

1 Select the stock and cut the parts. While you can make the tilt top table from an attractive hardwood, this is a country piece at heart. Keep the table utilitarian and economical by building it of pine and giving it a colorful paint job. Look for straight, flat stock, without knots. If you plan to apply a stain or clear finish, try to find boards with interesting grain patterns to make up the tabletop. Joint, plane, rip, and cut the parts to the sizes given in the Cutting List. Don't cut the feet to shape until after you have mortised them.

2 Glue up the tabletop. Lay out the boards that will make up the tabletop, choosing (and marking) the best face of each. Glue up the boards and set the piece aside while the glue dries.

3 Cut the mortises in the legs and pivot posts, feet, and posts. While the glue in the tabletop is drying, work on the rest of the table. Cut all the mortises at one time. All are through mortises.

Lay out each mortise carefully, as shown in the *Gate Assembly* and the *Post and Trestle Layout.* To cut the mortises, drill a series of adjacent holes between the layout lines with a bit as wide as the mortise. Before you drill, clamp a piece of scrap to the stock on the back side of the mortise. Drill completely through the stock and into the scrap. The scrap prevents the bit from splintering the wood as it exits. Square up the cavity with a chisel.

While you are cutting the mortises, also cut the dovetail slot at the top of each post. For more information on laying out

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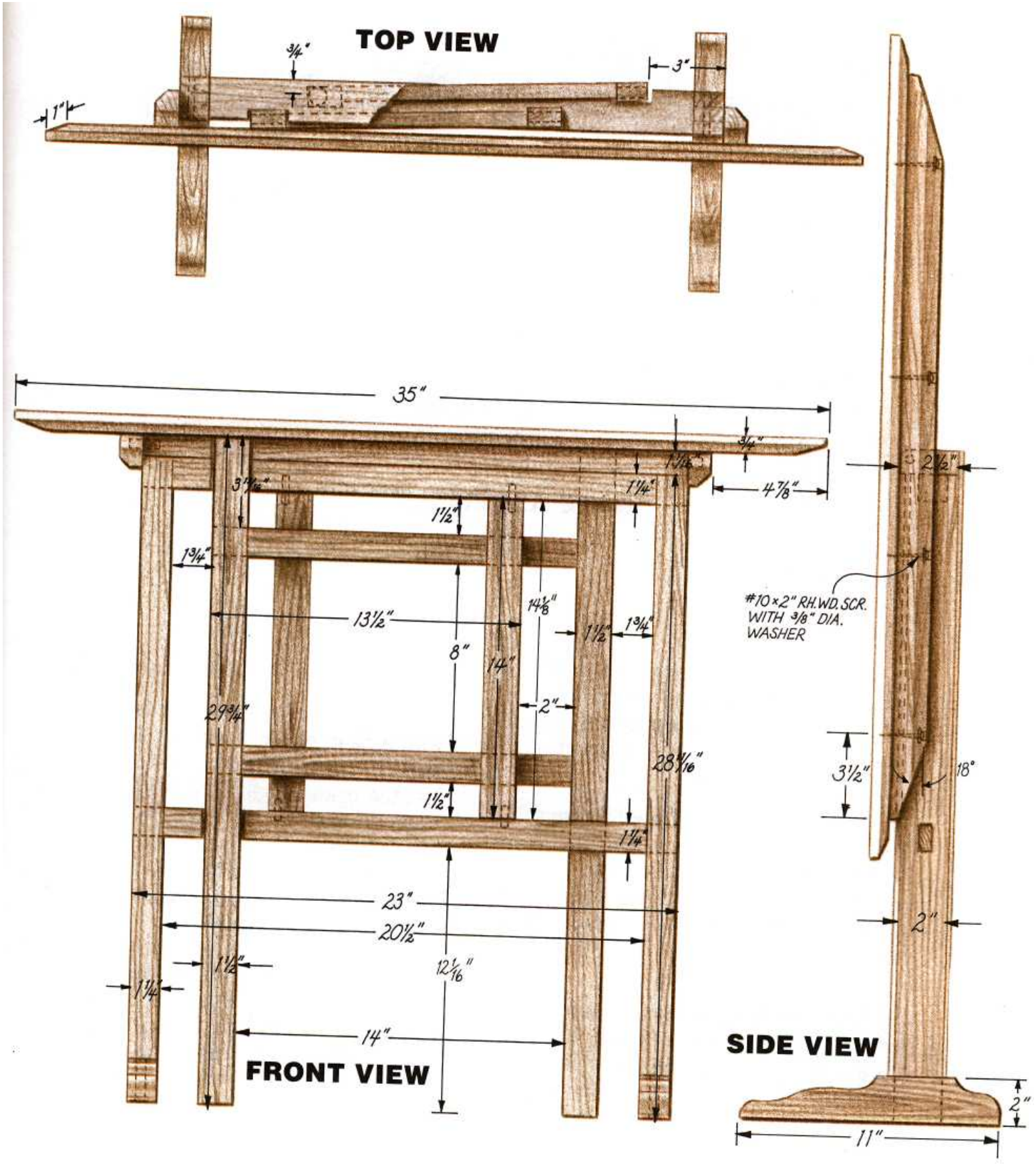

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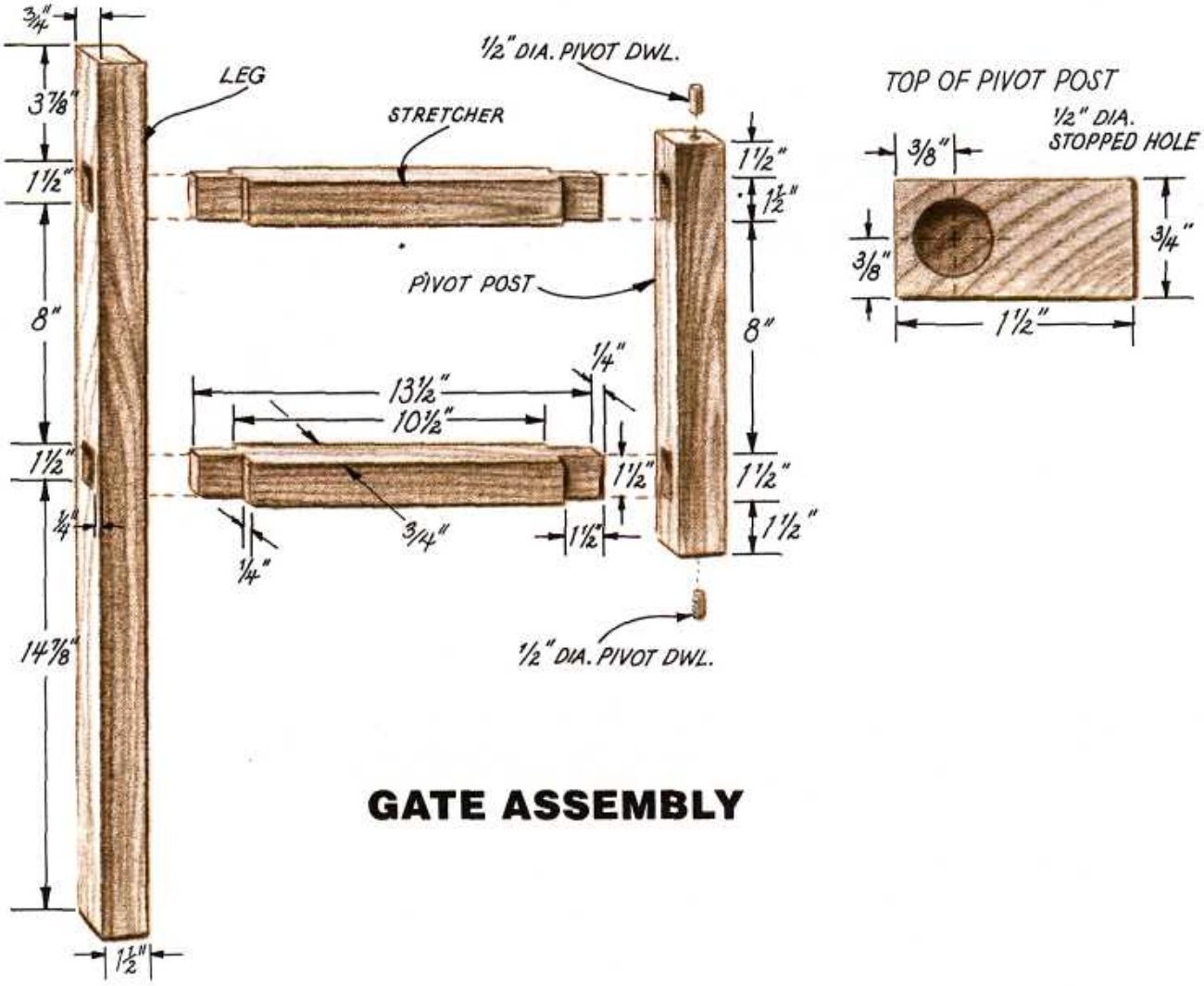

GATE ASSEMBLY

the joint see "Dovetailing" on page 42. Cut along the layout lines with a backsaw. Cut away most of the waste with a band saw. Remove the rest with a chisel.

4 Cut the foot to shape. Draw a ¼-inch grid on a piece of paper and draw the *Foot Pattern* onto it. Transfer the pattern to the stock and cut out the foot on the band saw. Sand the sawed edge smooth.

5 Cut the tenons on the posts, stretchers, and trestles. The tenons are not uniform: The posts have one size tenon; the stretchers, a second size; and the bottom trestle, a third. Lay out the tenons on the stock, as shown in the *Post and Trestle Layout* and the *Gate Assembly.*

Cut all these tenons on the table saw with a dado blade. First, set up the dado blade to cut its maximum width. Then adjust the blade height so that a cut on both sides of the board leaves a tenon the proper thickness. Adjust the fence so that when you guide the end of a board along it with the miter gauge, it cuts the tenon shoulder in the right place.

Test your setup on a piece of scrap the exact thickness of the piece you will be tenoning. Butt one end against the fence and use the miter gauge to guide it over the dado blade. Slide the stock away from the fence and make another pass. Repeat until the first cheek is completed, then flip the work piece and repeat the full

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process to cut the tenon's second cheek.

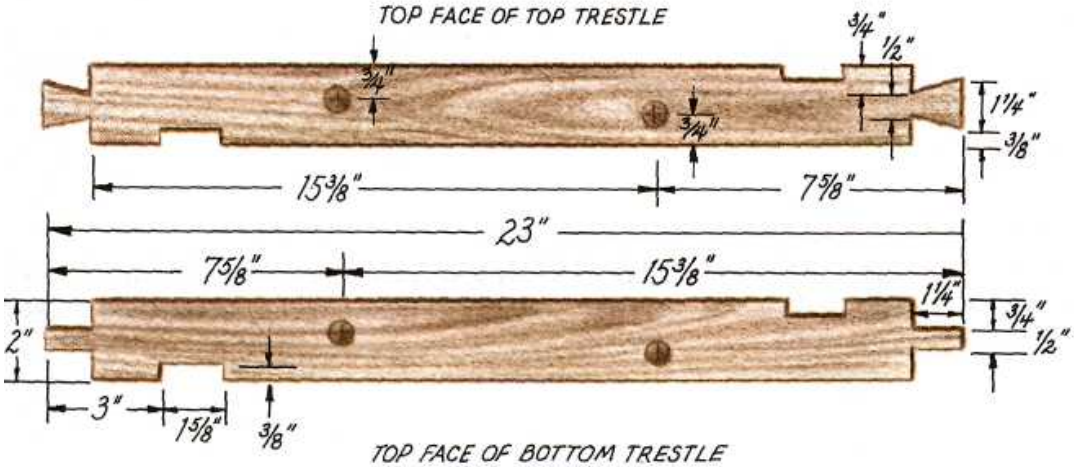
Cut all the tenons.

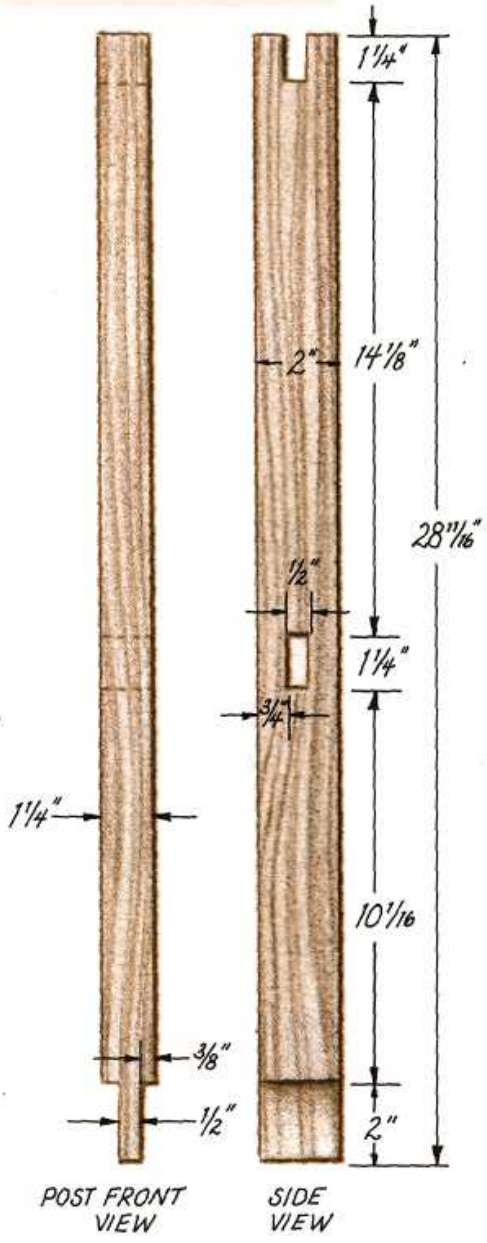
With the dado blade still in the saw, cut two notches in each trestle, as shown in the *Post and Trestle Layout.* When the table is tilted up, the gatelegs fold up against the trestle and into these notches, as shown in the *Top View.*

After cutting all the tenons, cut the dovetail on each end of the top trestle. Use a backsaw to rough out the tail, then refine the fit by paring with a sharp chisel.

SHOP TIP: Set up your table saw using the mortised piece as a guide. Put the mortise next to the blade with its long edges parallel to the table. Raise the blade until it aligns with the bottom edge of the mortise. Next, position the rip fence to establish the length of the tenon. Line up the fence so that when you have one edge of the mortised piece butted against the fence, its opposite edge is aligned with the edge of the blade farthest from the fence.

POST AND TRESTLE LAYOUT





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6 Assemble the gates. The gates swing back and forth under the table to support it. Before gluing up the two gates, drill holes in the ends of the pivot posts for the pivot dowels that will link the gates to the trestle assembly. Position the holes as shown in the *Post and Trestle Layout.* Bore the ½-inch-diameter by ¾-inch-deep holes to accommodate the 1½-inch-long pivot dowels. Do *not* glue the pivot dowels to the gates.

SHOP TIP: A Forstner bit is the best bit to use for boring the pivot dowel holes. The bit cuts a precise and flat-bottomed hole. The absence of a protruding spur means you won't inadvertently penetrate the work piece before achieving the necessary depth for the pivot dowel.

Test fit each gate. If the joints fit properly, glue the gate together.

7 Assemble the table base. Test fit the table base. Insert the posts in the mortises in the feet, then connect them with the bottom trestle. Drop 1½-inch-long pivot dowels into their holes in the bottom trestle and fit the gate assemblies onto them. Put pivot dowels into the holes in the pivot posts, then top the unit with the top trestle.

Make any necessary adjustments and glue the trestle together.

8 Complete the tabletop. Remove the clamps from the tabletop, and sand or hand plane the glue joints smooth. On a table saw, cut a 10-degree chamfer around the bottom edge. Guide the tabletop against the rip fence as you cut.

To help steady the tabletop as you cut the chamfer, attach a plywood face to the rip fence. It should be as long as the fence and about 18 inches high. On most saws, you'll have to make the cut with the rip fence to the left of the blade. After cutting the chamfer, sand the tabletop smooth.

9 Make the battens and pivot support. Chamfer the battens on the table saw with the blade set at 45 degrees, as shown in the *Pivot Detail.* When the chamfer has been cut along the length of the battens, cut a 72-degree angle in the ends of the battens, as shown in the *Side View.* Lay out the angle with a protractor and straightedge and cut the angle with a jigsaw or band saw. Sand the sawed edge smooth.

The battens pivot when the top flips up. Drill a pivot dowel hole in each batten, as shown in the *Pivot Detail.*

The battens are screwed to the underside of the tabletop with #10 × 2-inch roundhead wood screws. Because the battens run perpendicular to the grain of the tabletop, allowance must be made for the top to expand and contract. To do this, drill ¼-inch-diameter screw pilot holes on 8-inch centers through the battens, as shown in the *Pivot Detail.* Then drill ⅜-inch-diameter by 3/16-inch-deep washer recess holes as shown. Put washers between the screw and the wood to keep the screw from slipping through the hole. As the tabletop expands and contracts, the screws will move back and forth in the holes.

Turn to the pivot support next. Drill a pivot dowel hole in each end of this piece, as shown. Rout a ½-inch roundover in what will be the top of the pivot support, as shown in the *Pivot Detail.*

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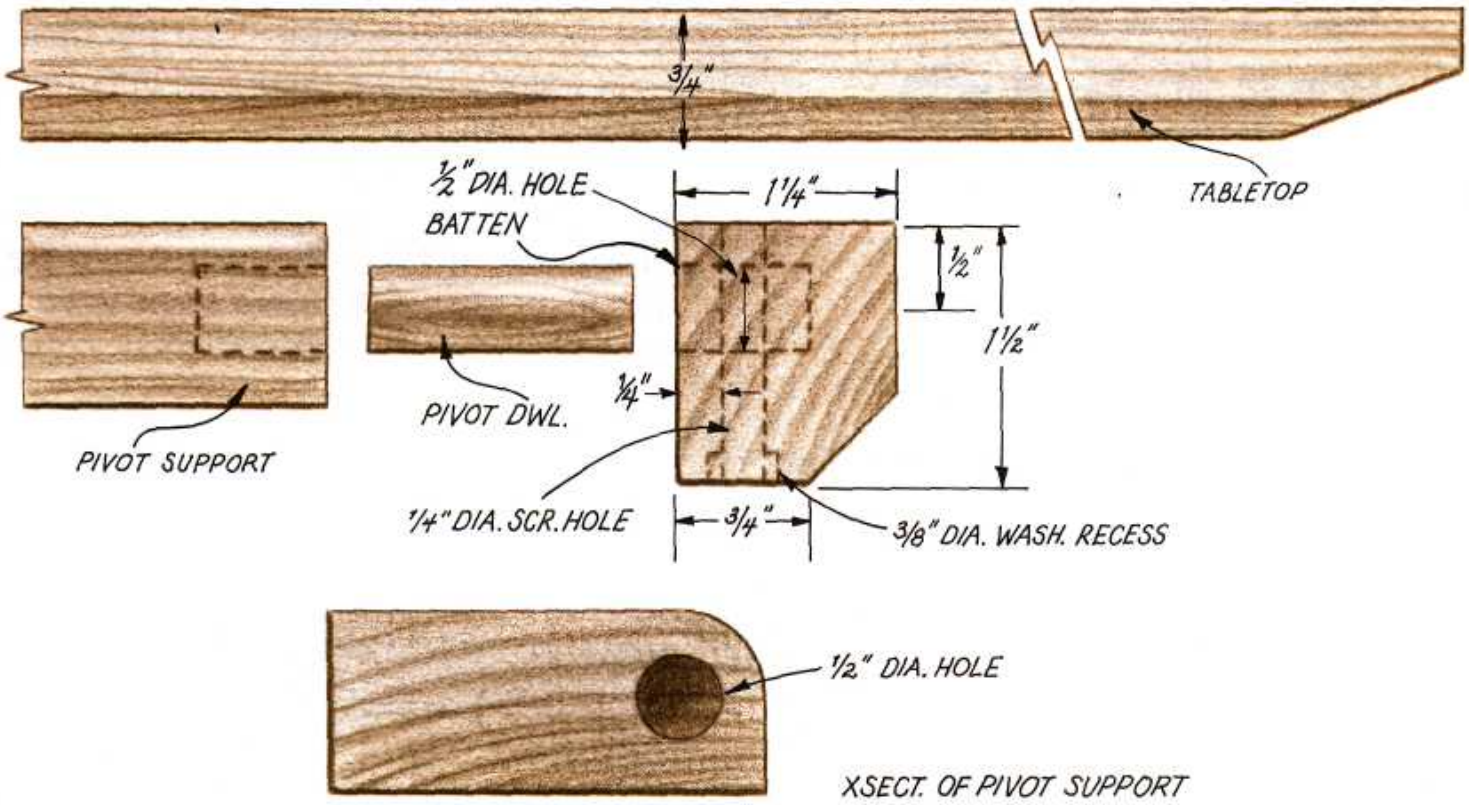
PIVOT DETAIL



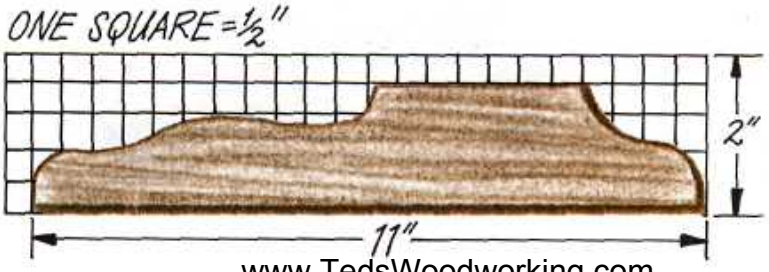
10 Assemble and install the tabletop. Turn the tabletop upside down on the bench and test fit the battens, pivot support, and pivot dowels on it. Poke an awl through the screw holes in the battens to lay out the screw holes in the top. Drill ⅛-inch-diameter pilot holes in the tabletop. Be careful not to drill all the way through the tabletop.

Check the pivoting action by rotating the pivot support. Make any necessary adjustments. Epoxy the pivot dowels in place and screw the battens to the tabletop.

Finally, set the table assembly—tilted—in place on the base assembly and clamp it. Drill screw holes through the pivot support into the trestle with a combination pilot hole bit. This bit drills a countersink hole, a clearance hole for the screw shank, and a slightly smaller pilot hole for the screw threads all in one operation. Combination pilot hole bits are available at most hardware stores and are sold according to the screw size.

11 Apply the finish. Sand the table and apply a finish. Be sure to apply the finish equally to all surfaces.

FOOT PATTERN



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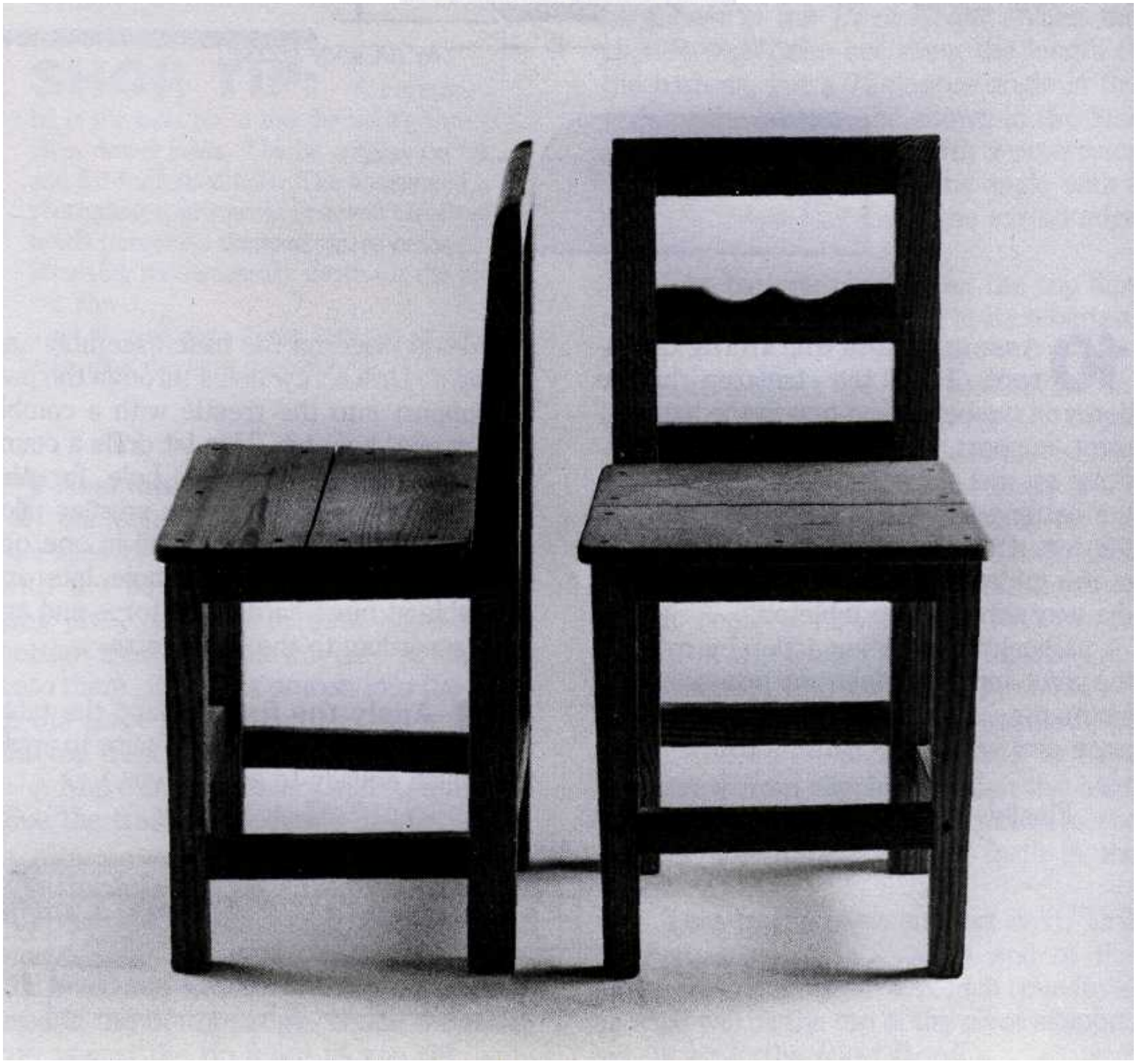
CHILD'S CHAIR



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EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Back legs	2	1 3/16″ × 1 3/16″ × 22″	
B. Front legs	2	1″ × 1″ × 12 1/8″	
C. Front rails	2	9/16″ × 1 1/8″ × 9″	
D. Back rails	2	9/16″ × 1 1/8″ × 7 3/4″	
E. Upper side rails	2	9/16″ × 1 1/8″ × 8 1/4″	
F. Lower side rails	2	9/16″ × 1 1/8″ × 8 1/4″	
G. Shaped rail	1	9/16″ × 1 5/8″ × 7 3/4″	
H. Top rail	1	13/16″ × 1 5/8″ × 7 3/4″	
I. Peg stock	1	1/8″ dia. × 25″	Dowel, makes 20
J. Seat boards	2	1/2″ × 4 1/8″ × 10 1/2″	
Hardware			
8 #8 × 1 1/4-in. flathead wood screws			

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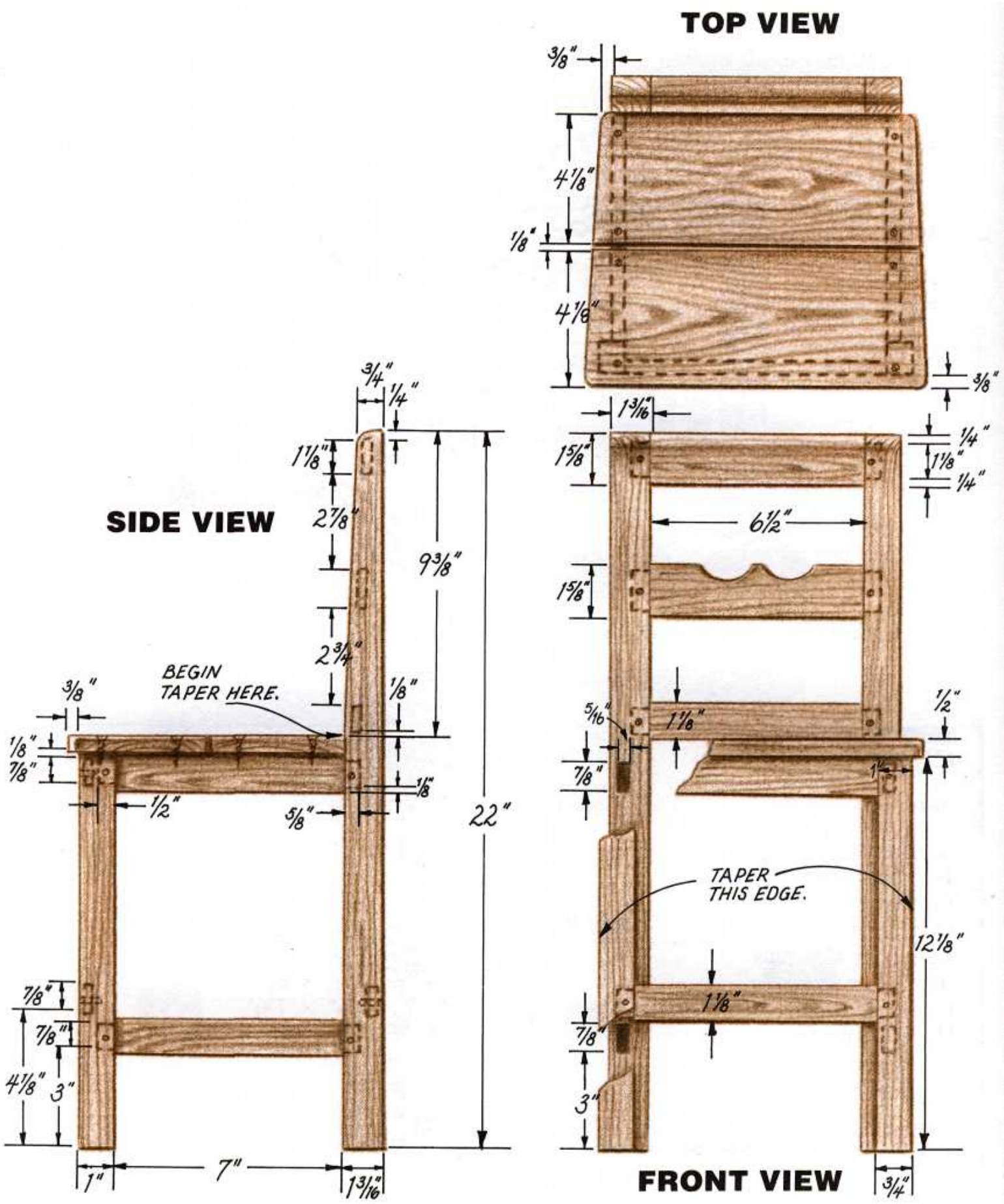

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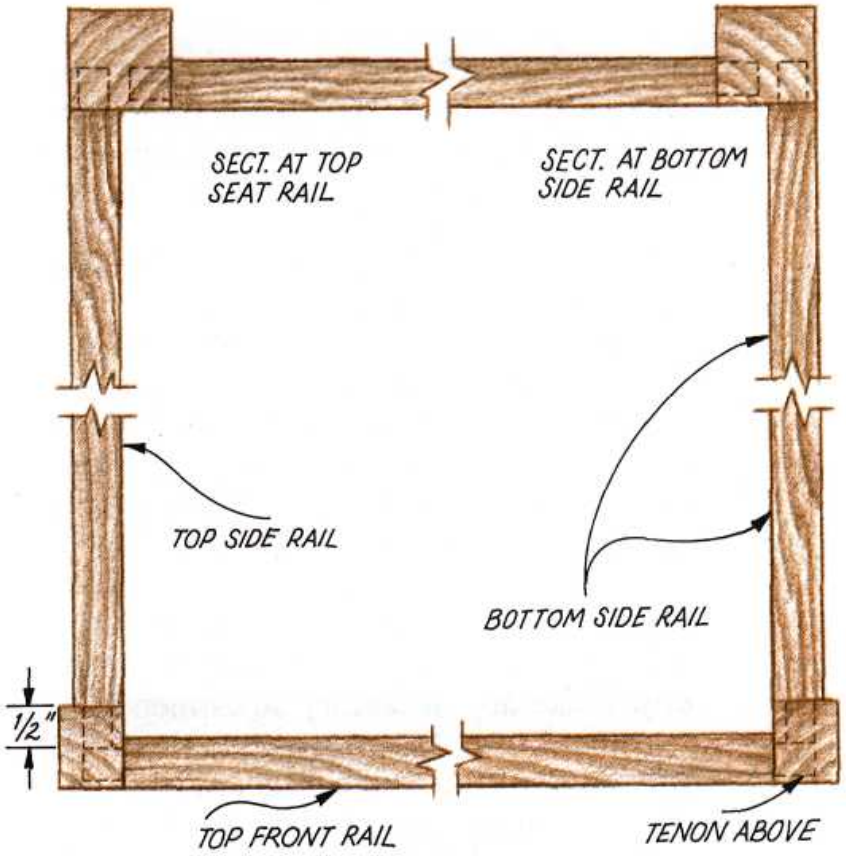
1 Select the stock and cut the parts. Make this chair from a user-friendly wood like pine. Hardwood isn't really necessary for a little chair like this one, and since pine is lightweight, a child will be able to move the chair easily. Joint, plane, rip, and cut the parts to the sizes given in the Cutting List.

2 Taper the back legs. The back legs are tapered above the seat. Lay out the taper, as shown in the *Side View,* directly on the stock and cut along the layout lines on the band saw. Stay about 1/16 inch to the waste side of your layout lines as you cut and clean up the surfaces with a hand plane or on the jointer.

3 Lay out and drill the mortises. Lay out the mortises, as shown in the *Front View* and *Side View* and the *Joinery Detail,* with a sharp pencil and straightedge.

Drill out the mortises with a series of adjacent 5/16-inch holes. Because all of the mortises are 1/8 inch from the edge of the legs, it's easiest to do this on a drill press. Clamp a fence to your drill press table and position it 1/8 inch from the bit. Hold the legs against the fence as you drill the mortises. Adjust the drill press to drill 11/16-inch-deep holes.

When you've drilled out all of the mortises, cut along the layout lines with a sharp chisel.



JOINERY DETAIL

SHOP TIP: When laying out matching parts, such as the front legs and back legs on this chair, measure and mark one piece, then use that piece to lay out its partner. If you're making a number of chairs, you might want to mark the critical measurements on a piece of scrap wood and use that to lay out all the matching parts. Chairmakers often put every measurement for an entire chair on one of these layout aids, which they call a chair "stick" or "rod."

4 Cut the tenons. All the tenons, except for those on the top rail, are 5/16 inch thick and have 1/8-inch shoulders. They can be cut with one setup on the table saw.

Put a 5/8-inch dado blade in your table saw and raise it to cut a groove 1/8 inch deep. Clamp a wooden auxiliary fence to the table saw fence and adjust it so that the wooden fence just touches the edge of the dado blade.

Cut a test tenon in a piece of 9/16-inch scrap. Guide the scrap as you cut with a

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miter gauge set at 90 degrees. Test the width and length of the tenon in one of the mortises. Adjust the dado blade height and fence position, as necessary, and cut the actual chair tenons.

Trim the front tenon on each upper side rail so it is ½ inch long.

Reset the blade to tenon the top rail. Raise the dado blade to ¼ inch above the surface of the table to cut a 5/16-inch-thick by 1⅛-inch-wide tenon on each end of the top rail. Test the setup on a piece of scrap and cut the tenons on the top rail.

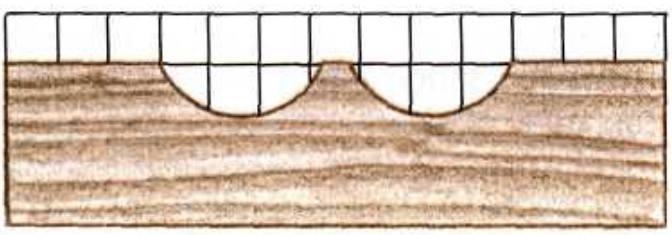
5 Test fit the chair. Test fit the chair and check that all the joints fit properly. Make any necessary adjustments.

6 Taper the front legs. The front legs taper from 1 inch down to ¾ inch, as seen from the front. Lay out the taper, as shown in the *Front View,* on both front legs. Cut the taper down to the layout line with a sharp hand plane or cut away the waste on the band saw; clean up the saw marks with a hand plane or sander.

7 Cut out the shaped rail. Make a ¼-inch grid on a piece of paper and draw the *Shaped Rail Pattern* onto it.

SHAPED RAIL PATTERN

ONE SQUARE = ½"



Transfer the pattern to the rail and cut it to shape on a band saw. Clean up the saw marks with files and sandpaper.

8 Assemble the chair frame. Assemble the chair in stages. First, glue the front rails between the front legs. Apply glue to the surfaces of the mortises and tenons. Pull the joints together with pipe or bar clamps with the assembly laying on a flat surface to ensure that the frames won't be twisted.

Then glue the rear rails between the rear legs. When the glue is dry, glue the front and back together.

With the front and back assemblies still in the clamps, drill ⅛-inch-diameter by 9/16-inch-deep peg holes through the legs and into the tenons, as shown in the *Front View* and *Side View.* When the holes are drilled, cut the peg stock into 1-inch-long pieces, dip the pieces in some glue, and tap them into the holes. Because the holes don't go all of the way through the legs, you will have to trim the pegs flush with the surface of the legs.

When the glue is dry, remove the clamps and glue and clamp the side rails to the front and back of the frame. Set the chair upright on a flat surface, check to make sure the chair sits flat, and make any necessary adjustments.

With the chair still clamped, drill peg holes through the sides of the legs and into the side rail tenons, and then tap them in place.

Allow the glue to dry and remove the clamps.

9 Attach and angle the seat boards. First, center the seat boards across the top of the completed frame and leave a ⅛-inch gap between them, as shown in

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the *Top View.* Clamp the seat boards in place.

Next, drill holes for #8 × 1¼-inch flathead wood screws, as shown in the *Top View.* The best way to drill these holes is with an combustion pilot hole bit. Drill through the seat and into the rails. The combination pilot hole bit will drill a countersink hole, a clearance hole in the seat for the the screw shank, and a slightly smaller pilot hole in the rail for the screw threads all in one operation. Combination pilot hole bits are available in most hardware stores and are sold according to screw size.

Once you've drilled the pilot holes, put a ⅜-inch-thick piece of stock under the ledge created by the seat boards and guide a pencil against it to mark the ⅜-inch overhang on the bottom of the seat boards. Mark the ledge on both sides and remove the clamps.

Cut along the layout lines with a jigsaw or band saw and sand the sawed edges smooth. Reposition the seat boards on the frame and screw them in place.

10 Sand and apply the finish. Finish sand the chair. As you are sanding the chair, round-over any sharp corners. Round-over the top of the chair, as shown in the *Side View,* with files, a spokeshave, or a belt sander.

It might be a good idea to choose this chair's finish with the child for whom it's intended. But, of course, you might end up painting it hot pink or olive green.

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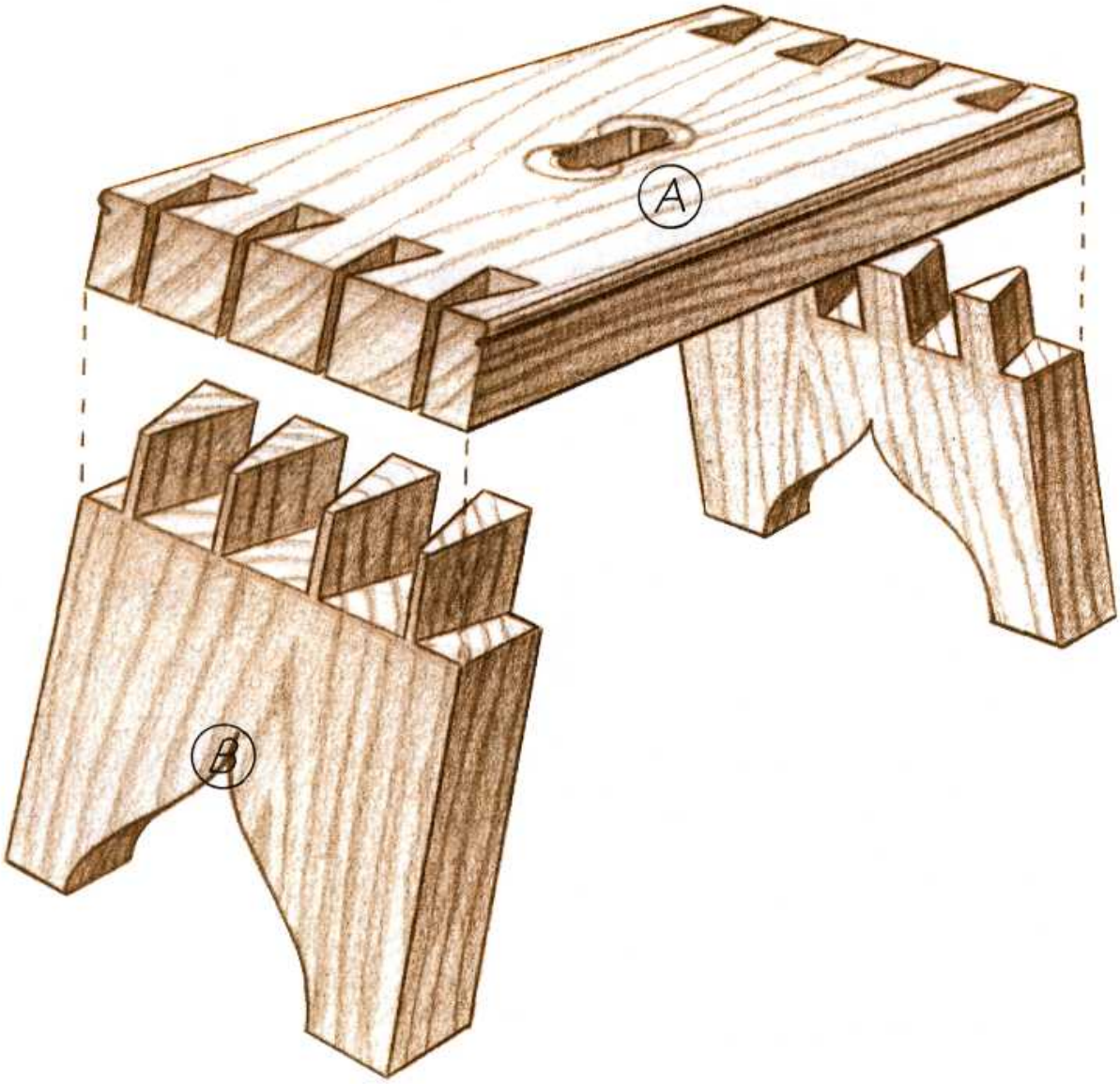
FOOT-STOOL



EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Top	1	1 5/16″ × 6 3/8″ × 12″	Cut to size when beveling.
B. Legs	2	1 5/16″ × 6 3/8″ × 7″	Cut to size when beveling.

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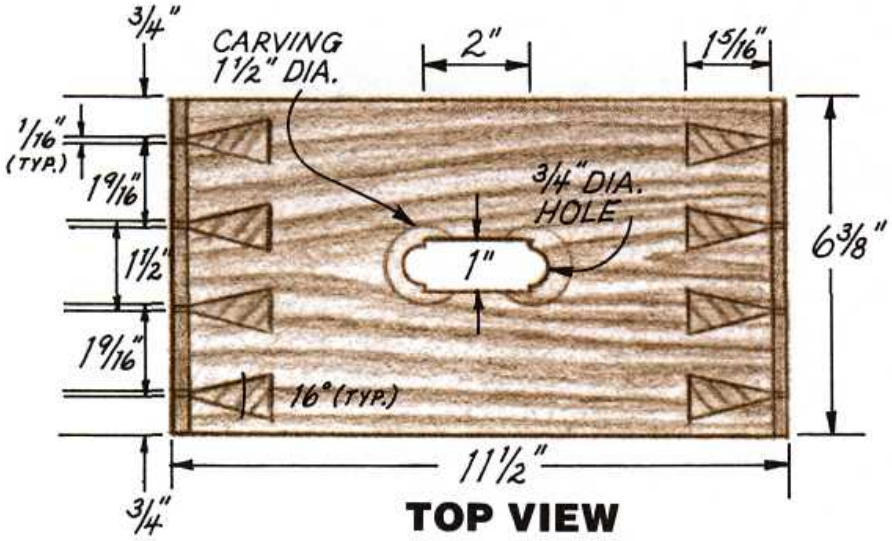
1 Select the stock and cut the parts. If you are not an experienced dovetailer, consider an easily workable wood like pine for your first attempt. If you've done some dovetailing, choose a more durable wood like walnut or cherry. Joint, plane, rip, and cut the stock to the sizes given in the Cutting List. For uniform grain pattern and color, cut the top and legs from a single board.

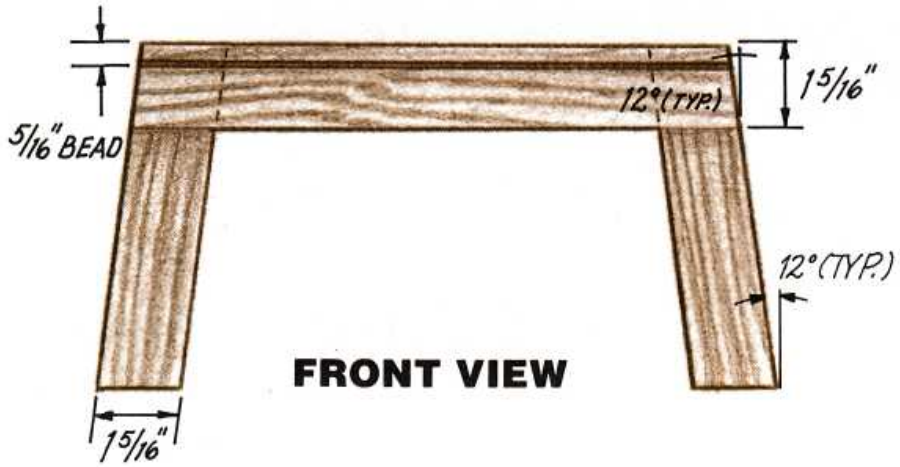
2 Cut the bevels. All the parts are beveled on both ends. Note that the bevels are parallel on the legs, but not on the top. Set the table saw blade to 12 degrees and, with the miter gauge as a guide, cut the miters shown in the *Front View.*

3 Cut the dovetails. Cutting an angled dovetail is made much like cutting a regular dovetail. If you haven't cut a lot of dovetails, practice on a piece of scrap. "Angled Dovetails" on page 168 shows you exactly how to cut the joint.

4 Cut out the leg shape. Draw a ½-inch grid on a piece of paper and draw the *Leg Pattern* onto it. With the legs removed from the top, transfer the pattern to the legs. Cut out the shape with a band saw or jigsaw.

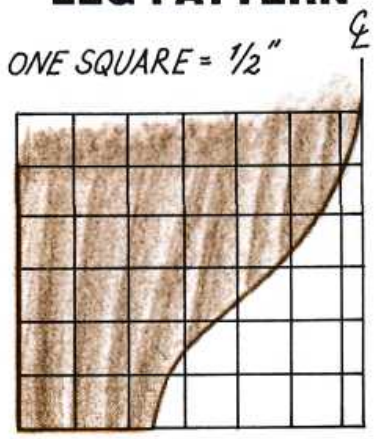


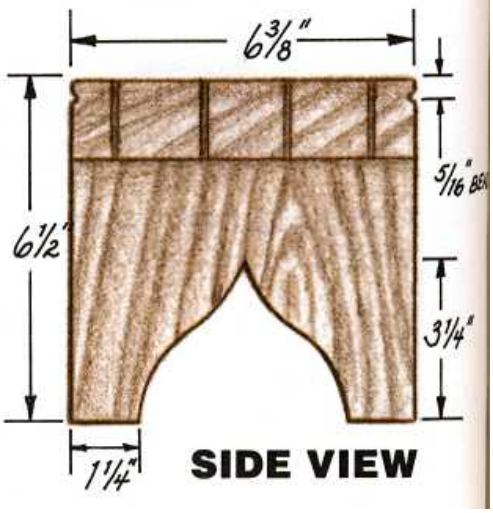
TOP VIEW



FRONT VIEW

LEG PATTERN





SIDE VIEW

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SHOP TIP: To get two identical legs, cut both at once. First stack the pieces together and secure by putting double-sided tape between them. Then cut both legs in one operation.

5 Cut the handhold in the top. Lay out and drill the holes in the top, as shown in the *Top View.* When the holes have been drilled, lay out and connect them by cutting away the wood between them with a jigsaw.

If you wish, carve around the handhold, as shown, with a V-shaped chisel called a parting tool.

6 Rout the bead in the top. Put a 5/16-inch beading bit in your router. Secure the router in a router table. Guide the top along the fence to cut a bead in the top, as shown in the *Front View.*

7 Assemble the stool. Spread glue on the tails and pins and clamp the legs to the top.

When the glue has dried, sand the dovetail joints even and scrape away any excess glue on the stool bottom.

8 Apply the finish. Finish sand the stool, removing all scribe marks. Stain and varnish, or paint the stool.

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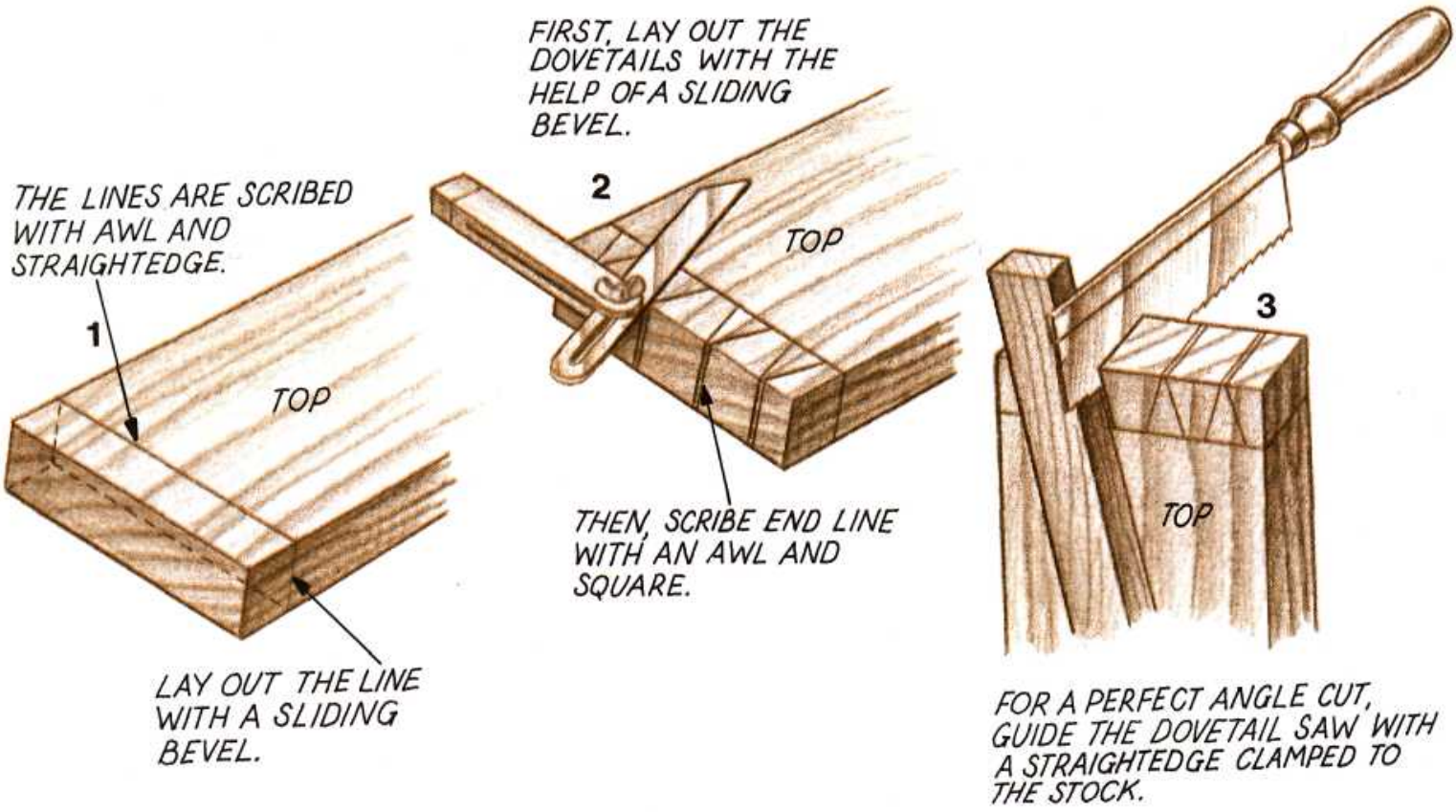
ANGLED DOVETAILS



1 Lay out the length of the pins and tails. Angled dovetails are much like regular dovetails in that they are made of pins and tails. The tails are on the top of the stool; the pins are on the legs. You may notice that these dovetails are unique: The outside edge of the joint ends in half *tails* to make routing the bead easier. On most dovetail joints, the edges end in half *pins*.

The angled end of the stool makes it impossible to lay out the base of the tails with a marking gauge. Scribe the line with an awl and straightedge instead. Scribe the line 1 5/16 inches from the end of the board, as shown.

2 Lay out the tails. The *Top View* shows the exact location and shape of the tails. Lay out the tails with a sliding T-bevel on the tip face of the board. Then, lay out the angle of the tails on the back face of the board, so that they meet the lines you have just drawn.

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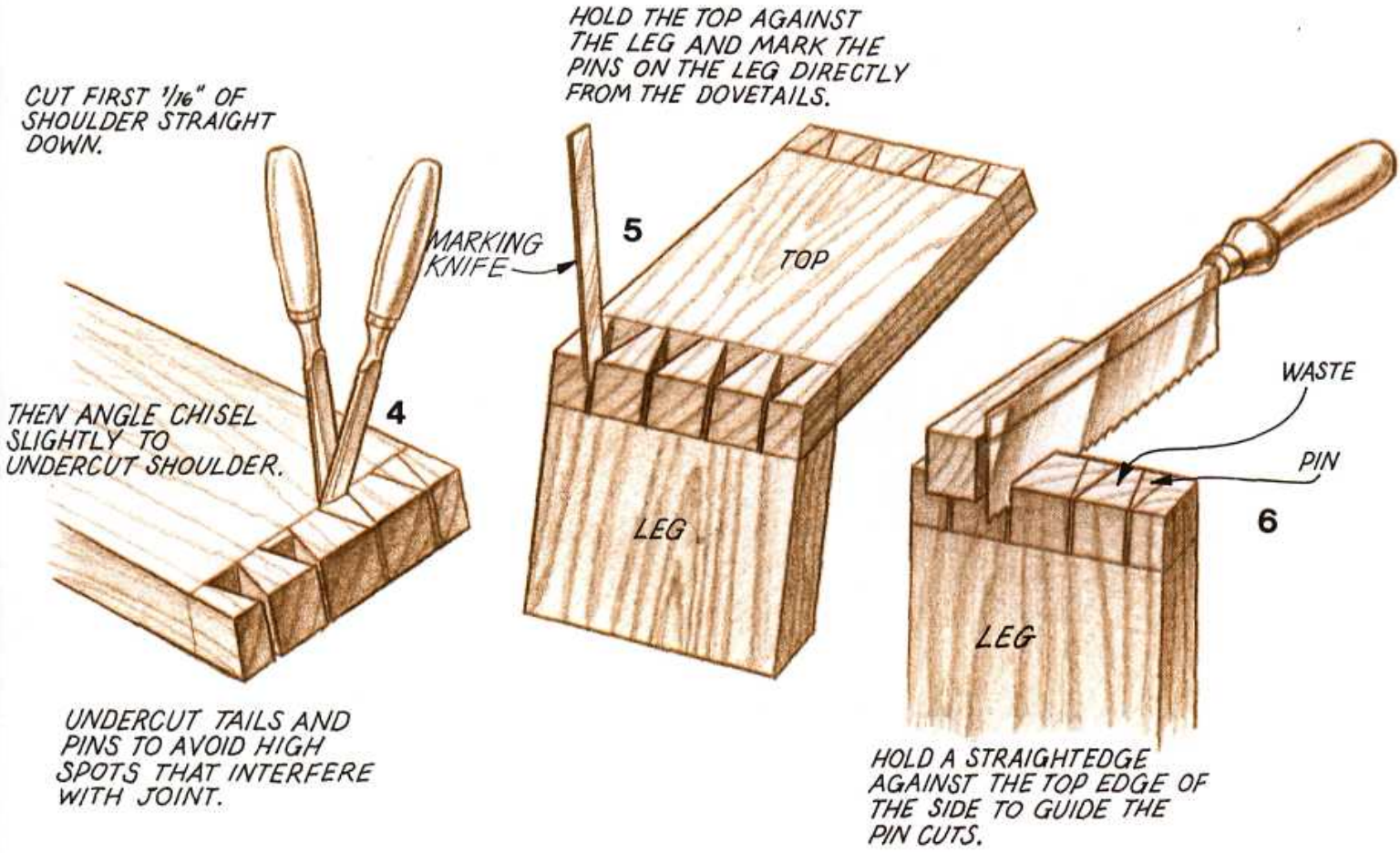

3 Cut out the tails. Saw down to the scribe line, cutting on the waste side of the layout lines. A Japanese Dozuki saw, like the one shown here, is easy to control and cuts crisp lines. Watch your layout lines carefully: Follow the angle of the pins and make sure you don't cut through either one of the scribe lines.

4 Chisel out the waste between the tails. Chisel halfway through the board from one side; turn the board over and chisel from the other side. Undercut slightly, as shown, to ease assembly of the joint.

5 Lay out the pins. For best results, lay out the pins by tracing around the tails. Hold the top and one leg together and lay out the pins with a marking knife directly from the tails. Carry your layout lines down to the scribe lines and clearly mark the waste with a pencil.

6 Cut out the pins. Saw along the layout lines to the scribe lines and chisel away the waste as before. Test fit the dovetails. Pare the pins to fit the tails if necessary. Do not glue them in place yet.

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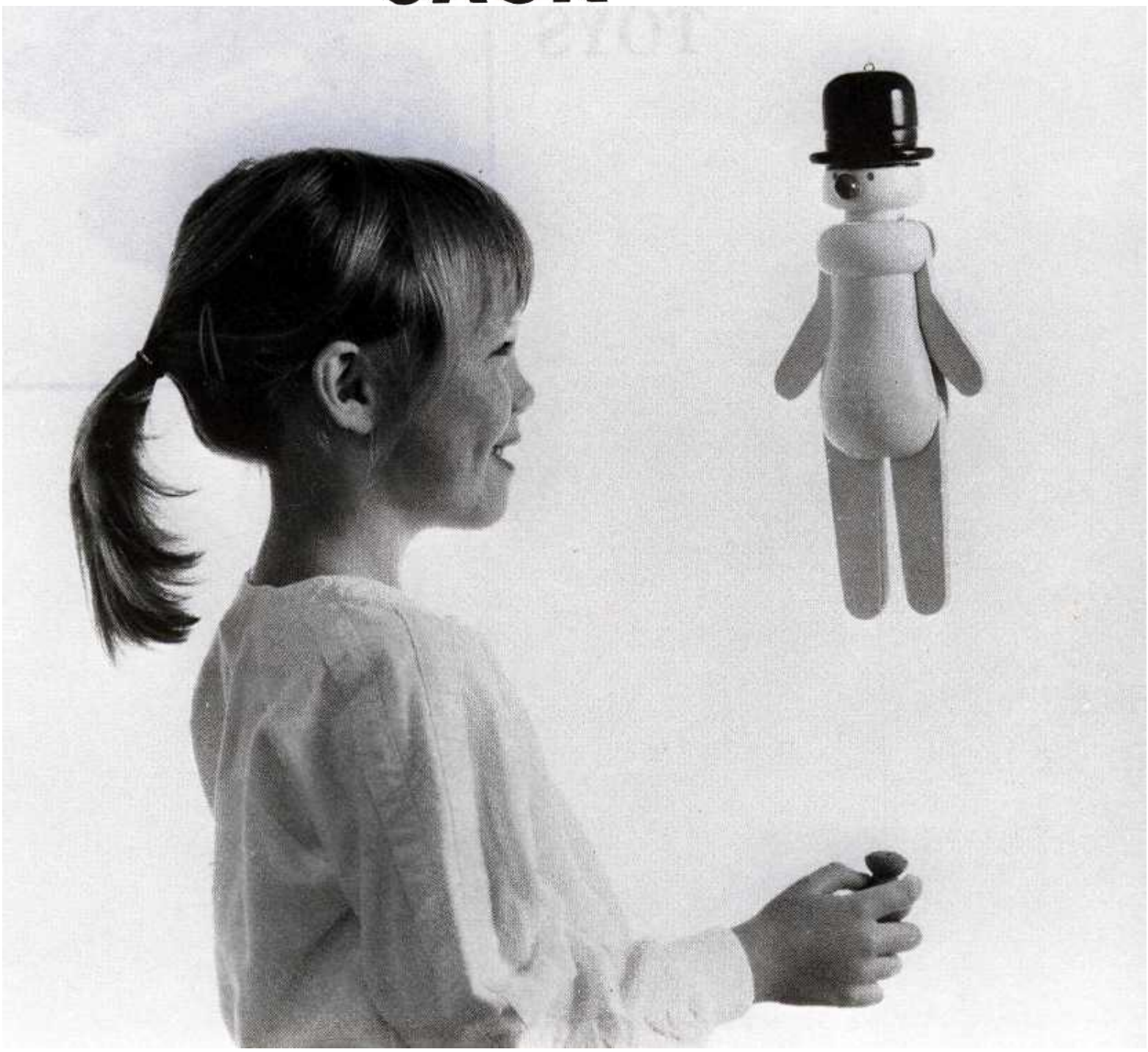
JUMPING JACK



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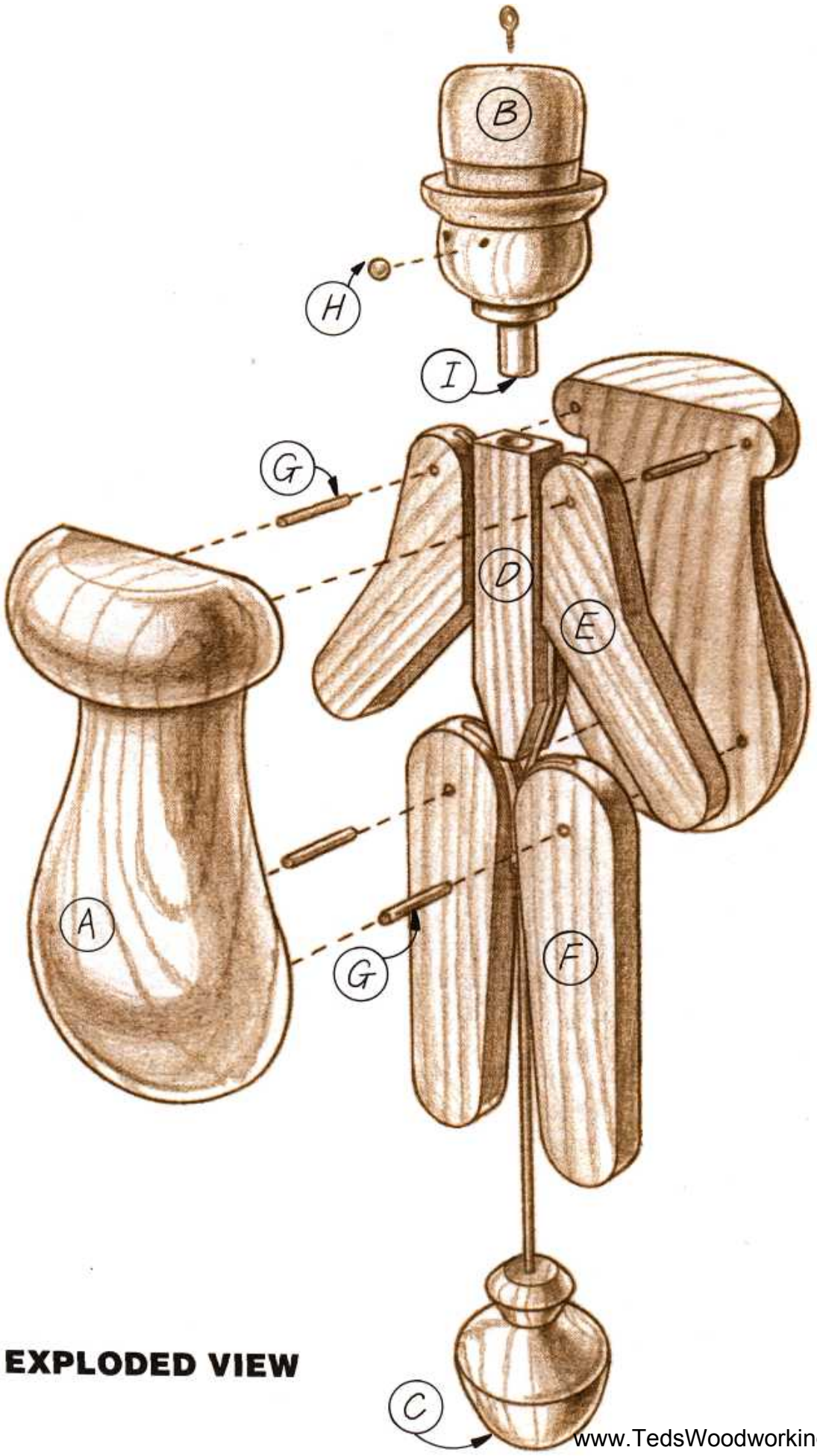

EXPLODED VIEW

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SHOP TIP: To get accurate turned profiles, make templates from ¼-inch plywood. Cut the plywood to the shapes of the grids shown in the *Body, Side View; Head, Front View;* and *String Pull Detail.* As you turn each part on the lathe, hold the template against it to help gauge the proper shape. Each template allows for ¾-inch-diameter waste on each end of the turnings.

4 Cut the angle in the end of the divider. Mark and cut the angle, as shown in the *Body, Front View,* with the band saw or coping saw. When the angles have been cut, sand the divider edges. Round the corners well because the pull string will rub against them.

5 Cut the arm and leg shapes. Draw a ¼-inch grid on a piece of paper and draw the *Arm Pattern* onto it. Transfer the pattern to the wood. Be sure to follow the grain direction shown. Cut the arms with a band saw or coping saw.

Lay out the legs on the stock by drawing the circles shown in the *Body, Front View* and connecting them. Cut the legs with a band saw or jigsaw.

Sand the rough edges smooth.

6 Drill the pivot holes in the arms and legs. Drill 3/16-inch pivot holes in the top joint of the arms and legs, as shown in the *Body, Front View* and the *Arm Pattern.*

7 Drill the joint dowel holes and test fit the body. Position the divider, arms, and legs on one half of the body, as shown in the *Body, Front View.* Make sure that the arms and legs can swing freely. Mark through the pivot hole with an awl. Drill ⅛-inch-diameter by ¼-inch-deep holes at each mark.

To locate the holes on the other body half, slip #4 × ½-inch flathead screws into the existing dowel holes *head first.* Position the two body halves on top of each other and press gently. The points of the screws will mark the center of the second set of dowel holes. Drill the second set of holes, but don't glue the pieces together yet.

Glue the dowels into the holes in one side of the body and put the arms and legs in place over the dowels. Position the divider so that it will not interfere with the arm or leg movement. Mark the divider's position with a pencil and glue it to that half of the body. Wipe away any excess glue.

Test fit the body and make any necessary adjustments. Don't glue the rest of the body together yet.

8 Drill the string holes and attach the string. With the arms and legs hanging down, mark them for the string holes shown in the *Body, Front View.* Insert one end of a 15-inch-long piece of durable string into each hole. Apply a drop of glue to the top of each hole and wedge the string in the hole with a toothpick. Trim the toothpick flush.

Run the arm strings down along the divider and between the legs. Run the leg strings down between the legs. With the arms and legs still hanging down, tie the four strings together just above the bottom edge of the body.

Cut off three of the strings at the knot. Thread the remaining string through the hole in the pull and knot it to keep the string from slipping through the hole. If

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the string is strung correctly, the arms and legs should swing up when the string is pulled.

9 **Attach the nose to the head.** The nose is a wooden ball, which is attached to the head with epoxy. Position the nose, as shown in the *Head, Front View.*

10 **Apply the finish.** Because the body has moving parts, it will be easier to apply the finish before assembly. Prepare for the finish by covering any parts that will be glued with masking tape. Cover the exposed dowels, dowel holes, and divider surface. Also cover the area on the one body half that will be glued to the divider. The jumping jack shown was painted. It has a white body, bright red nose, blue eyes, and blue hat.

11 **Assemble the body.** When the finish has dried, place the arms and legs over their joint dowels. Make sure that the string is following its appropriate path and glue the two body halves together.

12 **Attach the head to the body.** Drill neck dowel holes in the head and body, as shown in the *Body, Front View* and the *Head, Side View.* Assemble the head to the body with the neck dowel and glue.

13 **Hang your jumping jack.** Put the eyescrew in place in the top of the hat and hang up the jumping jack with some strong string. Give the string pull a tug and your jumping jack will jump into action.

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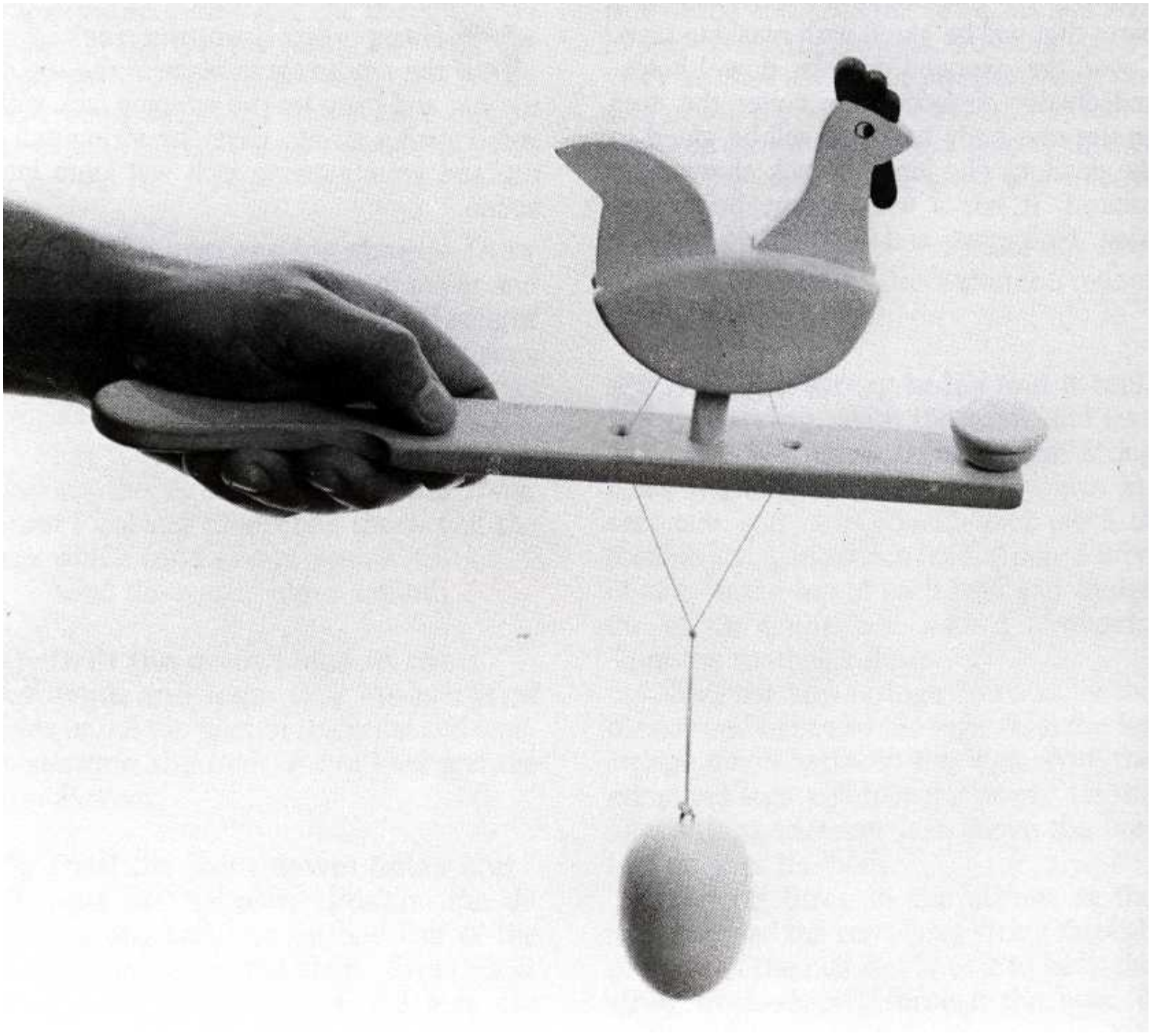
PICKIN' CHICKEN



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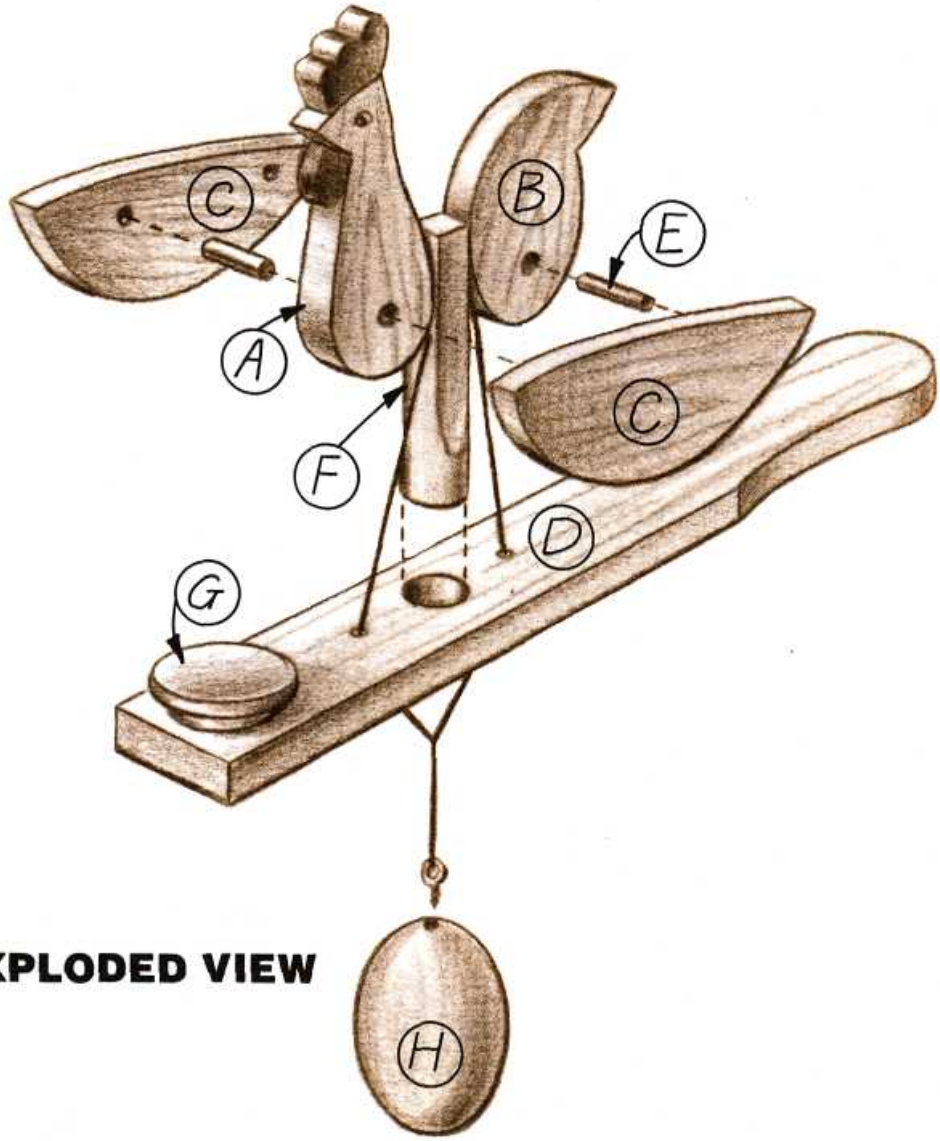

EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Head	1	3/8" × 2" × 4½"	
B. Tail	1	3/8" × 2¼" × 3¾"	
C. Sides	2	3/8" × 2½" × 4½"	
D. Handle	1	½" × 1⅜" × 12½"	
E. Pivot dowels	2	¼" dia. × 15/16"	
F. Center post	1	7/16" × 7/16" × 3⅜"	
G. Bowl	1	1 5/16" dia. × ½"	
H. Egg*	1	1¾" dia. × 3¾" long	Cut to size after turning.

*Wooden eggs are available from Trendlines, 375 Beacham Street, Chelsea, MA 02150. Specify Grade A, extra large.

Hardware

1 18-in. string
1 1¼-in. dia. × ½-in. long eyescrew
2 standard toothpicks
As needed, 1-in. brads

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1 Select the stock and cut the parts. Because this project has moving parts, make your chicken from a durable hardwood like poplar or maple. Joint, plane, rip, and cut the stock to the sizes given in the Cutting List.

2 Cut the head, tail, sides, and handle to shape. Draw a ¼-inch grid on a piece of paper and draw the head, tail, side, and handle patterns on it. Transfer the patterns to the wood and cut the parts to shape with a band saw or jigsaw.

To get two identical sides, cut both at once. First stack the pieces together and secure by putting double-sided tape between them. Then cut both sides in one operation.

3 Drill pivot and string holes in the head and tail. Lay out and drill the 5/16-inch-diameter pivot holes in the head and tail, as shown in the *Head Layout* and *Tail Layout.*

Mark the approximate position of the string holes shown in *Head Layout* and *Tail Layout.* The location isn't critical. An error of up to ⅛ inch won't affect the chicken's performance.

Put the head and tail in a vise and drill a hole 1/16 inch in diameter and ⅜ inch deep.

4 Round the edges of the sides. Put a ¼-inch roundover bit in your router. Secure the router in a router table and round-over the outer edges of the sides.

SHOP TIP: Always keep your hands well away from spinning cutters. Use two awls or ice picks as push sticks when routing small pieces like these.

5 Lay out and drill the dowel holes in the sides. Lay out the dowel holes on one side of the chicken, as shown in the *Side Layout.* Set up your drill press to drill ¼-inch-diameter by ¼-inch-deep holes on the inside surface of the sides. Be careful not to drill through the side.

Put a dowel center—available at most hardware stores—in each of the holes. Put the two halves of the chicken together. The dowel centers will mark the center of the holes in the second side. Drill the holes as before.

6 Mark the location of the center post. Once you've drilled the dowel holes, test fit the dowels in one of the sides and put the head and tail in position over them. With the head and tail in place, position the center post so that the head and tail pivot freely. Mark the location of the post.

7 Drill the holes in the handle. Lay out and drill the holes in the handle, as shown in the *Bottom View.* The two 3/16-inch holes are for the string that holds the egg. To prevent the string from wearing thin and breaking, chamfer the top and bottom edges of these holes with a countersink bit.

8 Turn or carve the bowl. Turn or carve the bowl to the approximate profile shown in the *Side View.* Don't worry if it doesn't look exactly like the one shown. The chicken won't notice.

9 Turn or purchase the egg. To get an accurate profile, make a template from ¼-inch plywood. Cut the plywood to the shape shown in the *Egg Layout.* When you turn the egg on the lathe, hold the

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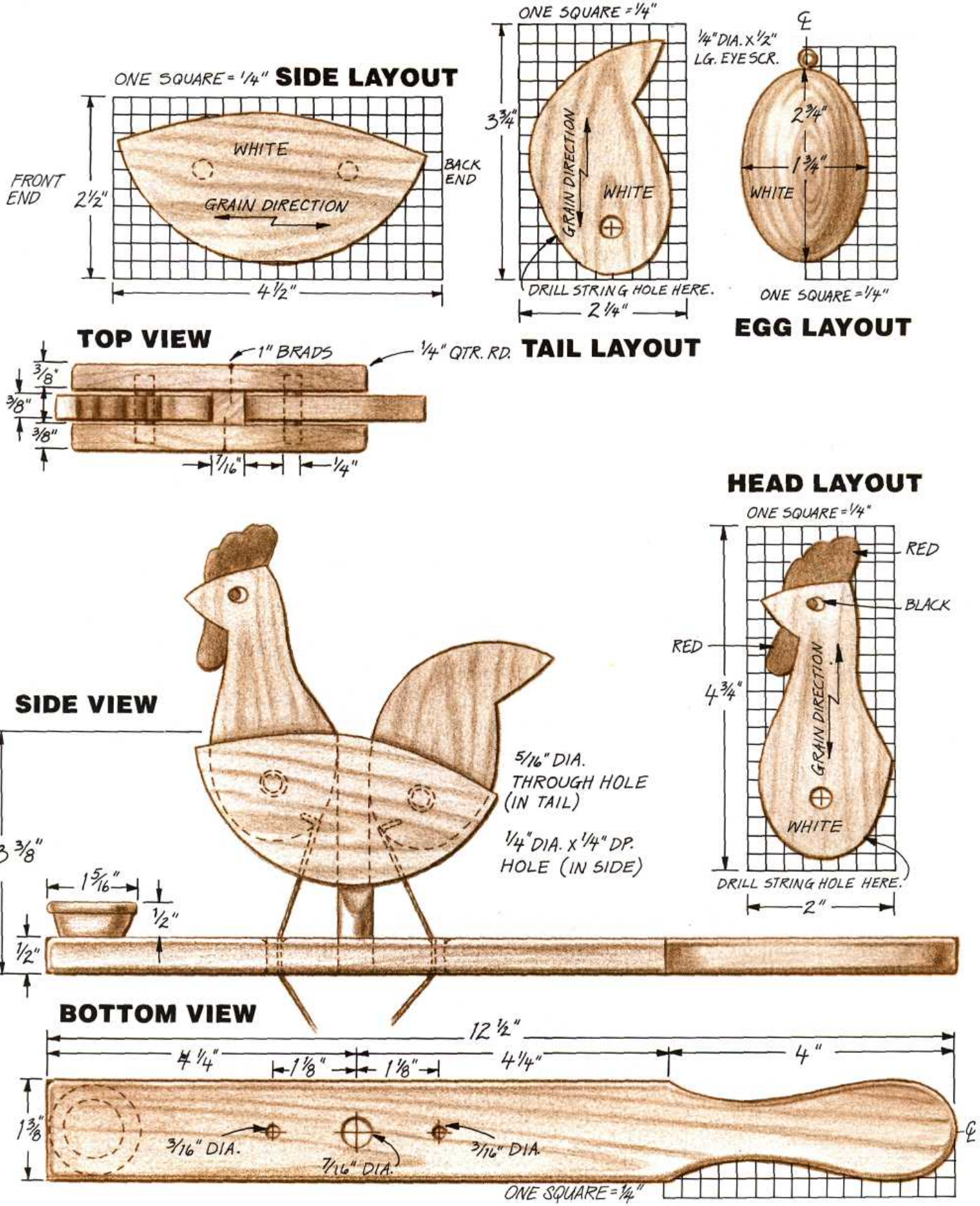

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template against the egg to help gauge the proper shape. Sand the egg while it is turning on the lathe.

You can also purchase wooden eggs from many craft stores, or from the source given in the Cutting List.

10 **Sand and paint the parts.** Finish sand all of the parts except for the center post. Take special care in sanding the edges of the string holes in the handle. The smoother these holes, the longer the string will last.

Paint all of the parts except for the bottom ½ inch of the center post. Be careful not to get paint into the dowel holes in the sides or the center-post hole in the handle.

11 **Assemble the pickin' chicken.** Cut an 18-inch piece of string into two equal lengths, one for the head and one for the tail. Glue the strings into their appropriate holes and wedge with slivers of wood or toothpicks.

Put a small bit of glue in the pivot-dowel holes. Don't apply too much glue. Clean up any glue that squeezes out. If glue gets on the head or tail of the chicken, the chicken won't work.

Put the head and tail in place, position the center post, and clamp the chicken together. With the chicken still in the clamps, drive two 1-inch brads through each side and into the center post. Allow the glue to dry.

When the glue is dry, cut and sand the top of the post even with top edge of the sides. With a knife or spokeshave, round the bottom of the center post until it fits into the center-post hole in the handle. Glue the center post into the handle.

Brad and glue the bowl onto the handle so that the chicken's beak will hit its center.

Run the strings through the holes in the handle, as shown in the *Side View.* Knot the strings together 2 to 2½ inches below the handle, and then attach them to an eyescrew driven into the top of the egg 5 to 6 inches below the handle.

Do any necessary touch-up painting. When the paint is dry, swing the egg back and forth, and watch the chicken bob into action.

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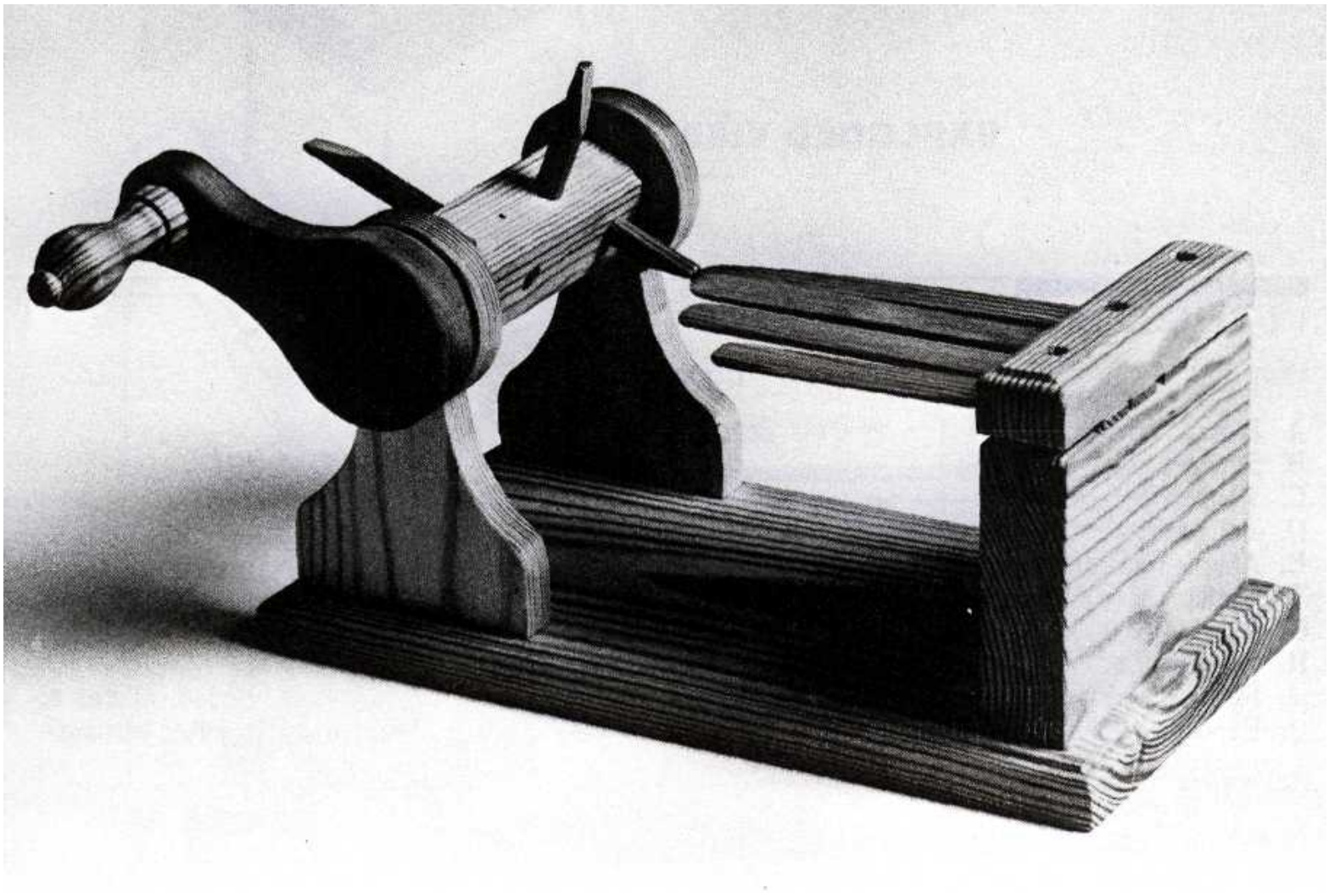
NOISE MACHINE



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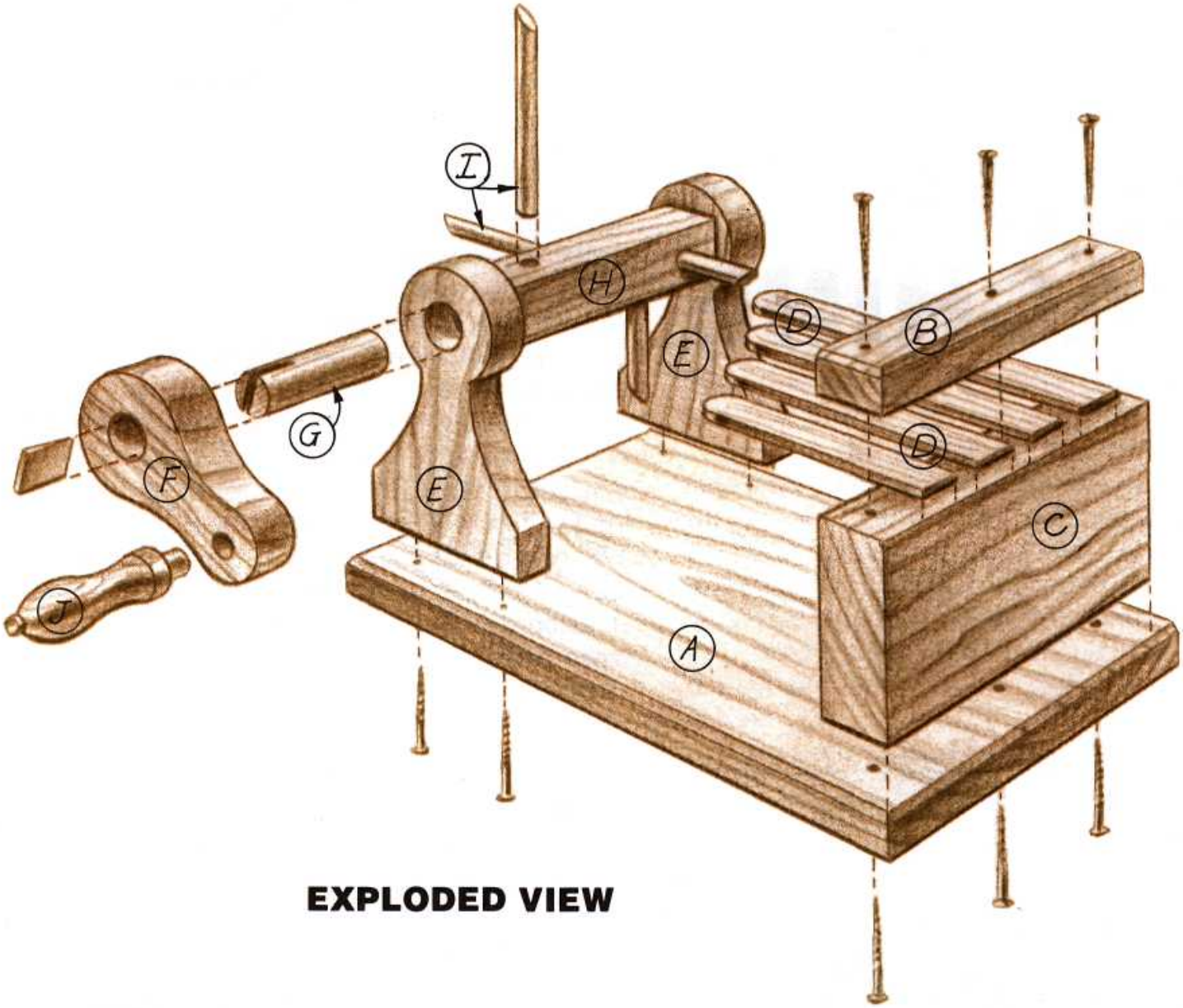

EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Base	1	7/8" × 6¾" × 12⅜"	
B. Support cap	1	7/8" × 1⅜" × 5¾"	
C. Tongue support	1	1⅜" × 3¾" × 5¾"	
D. Tongues	4	⅛" × ¾" × 10"	Trim to fit.
E. Axle supports	2	⅝" × 3¾" × 6"	
F. Crank	1	7/8" × 2½" × 5¼"	
G. Axle dowel stock	1	7/8" dia. × 5"	Cut to fit.
H. Peg block	1	1⅜" × 1⅜" × 4¾"	
I. Striking peg stock	1	⅜" dia. × 12"	Adjust as needed. Makes 4.
J. Handle	1	1" × 1" × 4⅜"	Cut to length after turning.

Hardware

10 #8 × 1¾-in. flathead wood screws

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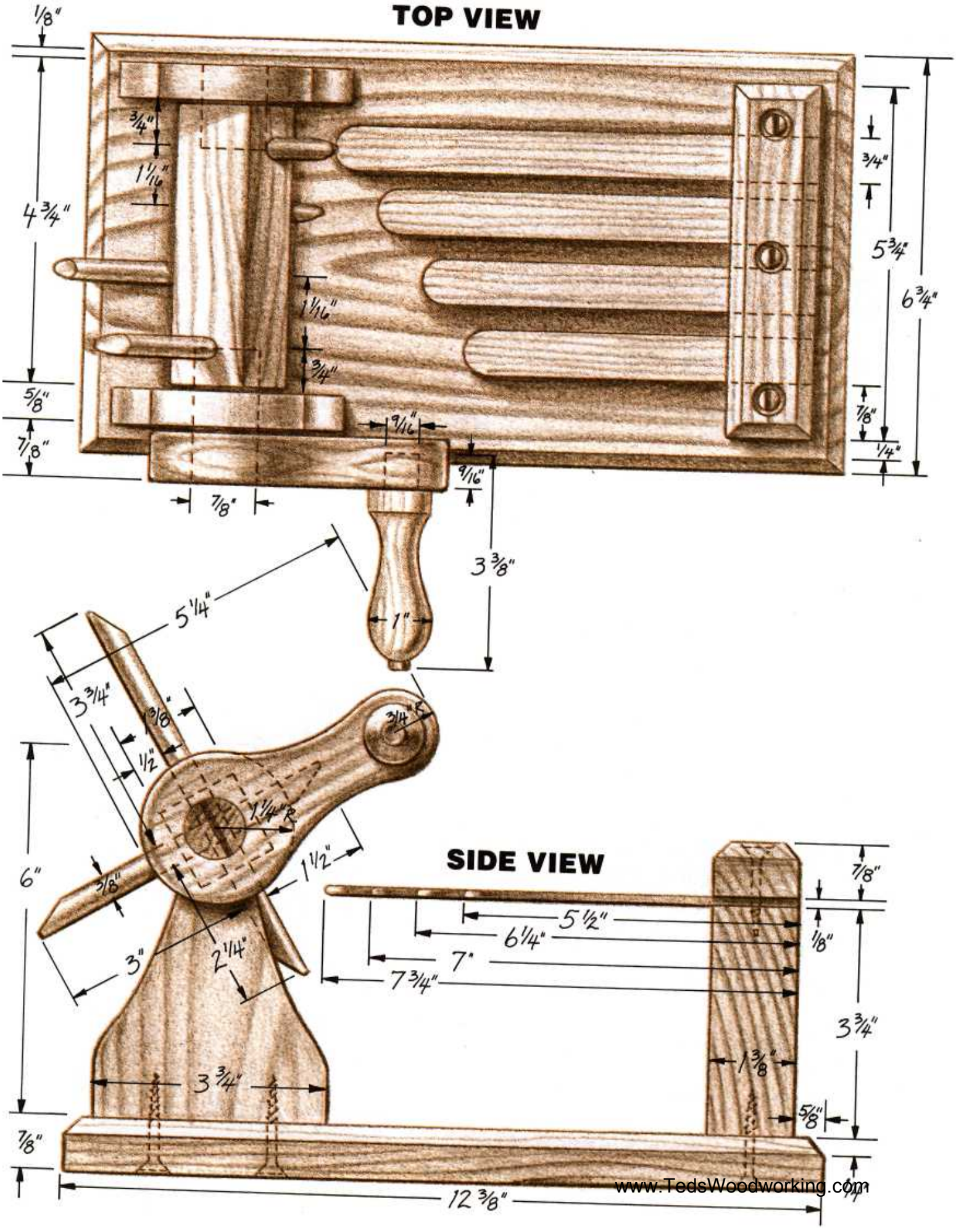

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1 Select the stock and cut the parts. Most hardwoods and softwoods are suitable for this project. Because the parts for this project are small, you can make them from scraps. Joint, plane, rip, and cut the parts to the sizes given in the Cutting List.

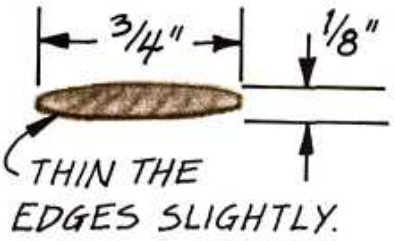
2 Chamfer the edges of the base and tongue support cap. Put a chamfer bit in your router. Secure the router in a router table and cut a chamfer all around the top edges of the base. Cut a matching chamfer on the support cap with a block plane.

3 Drill screw holes in the tongue support cap and tongue support. Clamp the tongue support cap on top of the tongue support and lay out the position of the three #8 × 1¾-inch flathead wood screws that hold the tongue support cap to the tongue support, as shown in the *Top View.* First, drill 7/64-inch-diameter pilot holes down into the tongue support. Next, drill a 5/32-inch-diameter clearance hole in the tongue support cap. Then countersink holes for the screw heads.

A combination pilot hole bit drills a countersink hole, a clearance hole for the screw shank, and a slightly smaller pilot hole for the screw threads all in one operation. These bits are available from most hardware stores and are sold according to the screw size.

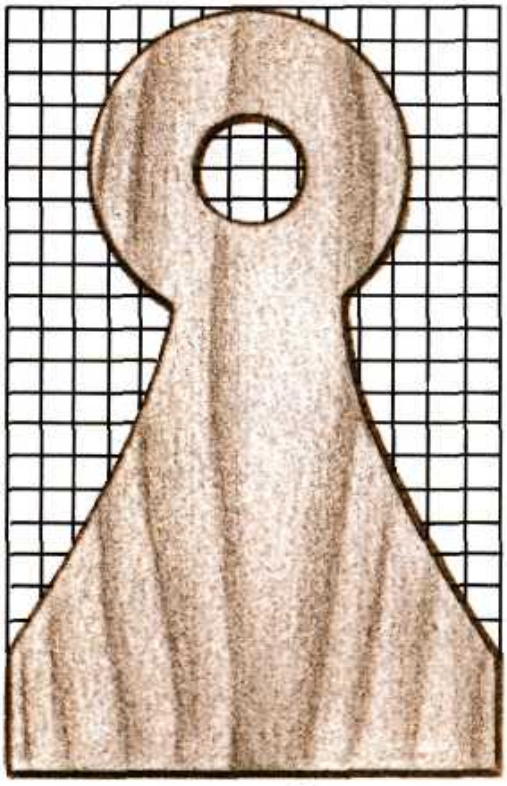
4 Shape the tongues. Lay out a 3/8-inch-radius curve on the end of each tongue and cut them to shape on a band saw.

The noise machine's tongues become thinner near the edges. As you sand the tongues to remove the saw marks, thin the edges slightly, as shown in the *Tongue End View.* Do not cut the tongues to their final lengths yet.



TONGUE END VIEW

5 Cut the axle supports and crank to shape. Draw a ¼-inch grid on a piece of paper and draw the *Axle Support Pattern* and the *Crank Pattern* onto it. Transfer the patterns to the wood and cut the parts to shape on a band saw. If you wish, first tape the stock for the two axle supports together with double-sided tape and cut out both pieces simultaneously. Sand away any saw marks.



AXLE SUPPORT PATTERN

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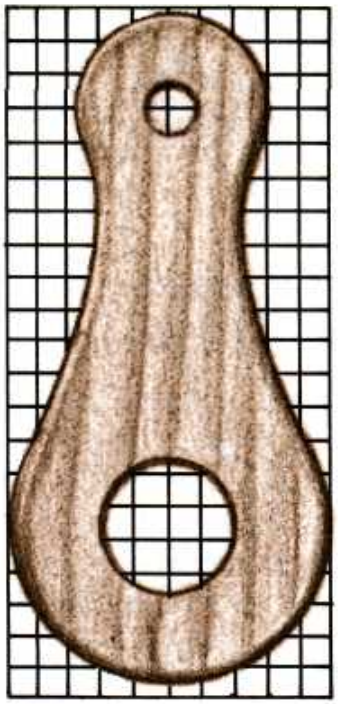
CRANK PATTERN



ONE SQUARE = 1/4"

6 Drill the holes in the axle supports and crank. On one axle support, mark the center of the top circular section. Align this support on top of the other and drill 15/16-inch axle holes in both supports at the same time.

Lay out the holes on each circular section of the crank. Drill a 7/8-inch-diameter hole in the large circle for the axle dowel. Drill a 9/16-inch-diameter by 9/16-inch-deep hole for the handle.

7 Assemble the axle. The axle is made up of a peg block and two axle dowels.

First, cut two axle dowels from the axle dowel stock. Cut one 2 3/8 inches long and one 1 3/8 inches long.

Next, drill a 7/8-inch-diameter by 3/4-inch-deep hole in each end of the peg block. Put a little glue in each hole, and insert an axle dowel.

When the glue is dry, cut a slot in the long axle dowel for a tightening wedge. To lay out the slot, slip the long axle dowel through the hole in one of the axle supports. Mark the axle dowel at the point where it protrudes. With a backsaw, cut a slot for a tightening wedge from the end of the axle dowel to the axle support mark.

Cut a thin 7/8-inch square tightening wedge from some hardwood scrap and sand the edges smooth.

8 Attach the striking pegs to the peg block. Lay out the position of the striking pegs on the peg block, as shown in the *Top View.* Drill 3/8-inch-diameter by 1/2-inch-deep holes for the pegs.

Cut the four different length pegs shown in the *Side View* from the striking peg stock. Round and bevel the striking ends of the pegs, as shown, with sandpaper and glue them into their corresponding holes. The longest peg will strike the shortest tongue shown, and the shortest peg will strike the longest tongue. Allow the glue to dry.

9 Turn the crank handle. Turn the handle to the profile shown in the *Handle Pattern.* Sand the handle while it is still on the lathe, remove it from the lathe, and cut off the waste with a backsaw. If you are unfamiliar with turning, *Creative Woodturning* by Dale L. Nish is a good introduction. If you don't have access to a lathe, purchase a small drawer handle at a hardware store.

10 Assemble the noise machine. First, clamp the tongue support in

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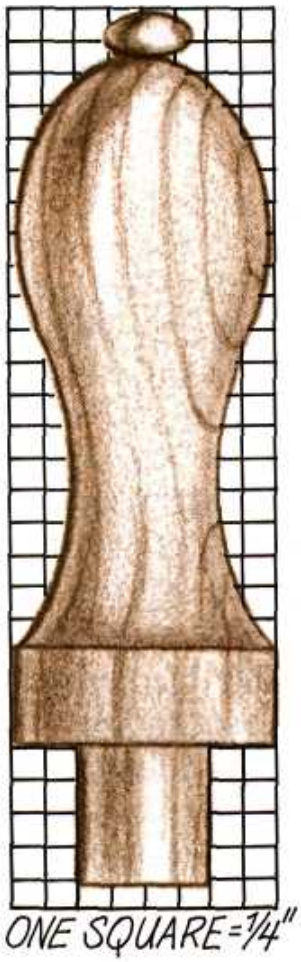
HANDLE PATTERN



position on the base. From the bottom, drill three holes with a combination pilot hole bit for #8 × 1¾-inch screws, as shown in the *Side View.* Space the holes evenly. Drive the screws in place.

Next, slip the axle supports onto the axle and then clamp the axle supports in position on the base. Drill holes for #8 × 1¾-inch screws as before and drive the screws in place.

With the axle supports screwed in place, spread a little glue in the axle dowel hole in the crank. Push the crank over the slotted axle dowel until you have about a 1/32-inch gap between the crank and the axle support. Position the crank on the axle so the slot is perpendicular to the crank's grain. Spread glue on the tightening wedge and carefully tap it into its slot.

When the glue dries, trim the wedge flush with the axle dowel. If the axles overhang the supports, trim them flush, too.

SHOP TIP: When fitting or gluing the axle and axle supports, place several folds of waxed paper between the parts. Once the glue has set, remove the paper for a free-spinning mechanism. You may also want to apply wax to the axle pins to prevent them from sticking. Be careful not to wax the slotted section of the dowel that is glued to the crank.

11 Adjust the tongues. Position the tongues on top of the tongue support and lightly screw on the tongue support cap. Notice that the screws do not go through the tongues.

Position the tongues, as shown in the *Top View.* Adjust the tongues so that as you turn the crank, the pegs just catch the ends of the tongues, causing them to sound. When the tongues are all adjusted, tighten the screws on the tongue support cap and trim the back ends of the tongues even with the tongue support.

12 Apply the finish. Give the noise machine a final sanding. A simple toy like this should have a simple finish, so rub on a one-step oil finish.

When the finish is dry, go make some noise.

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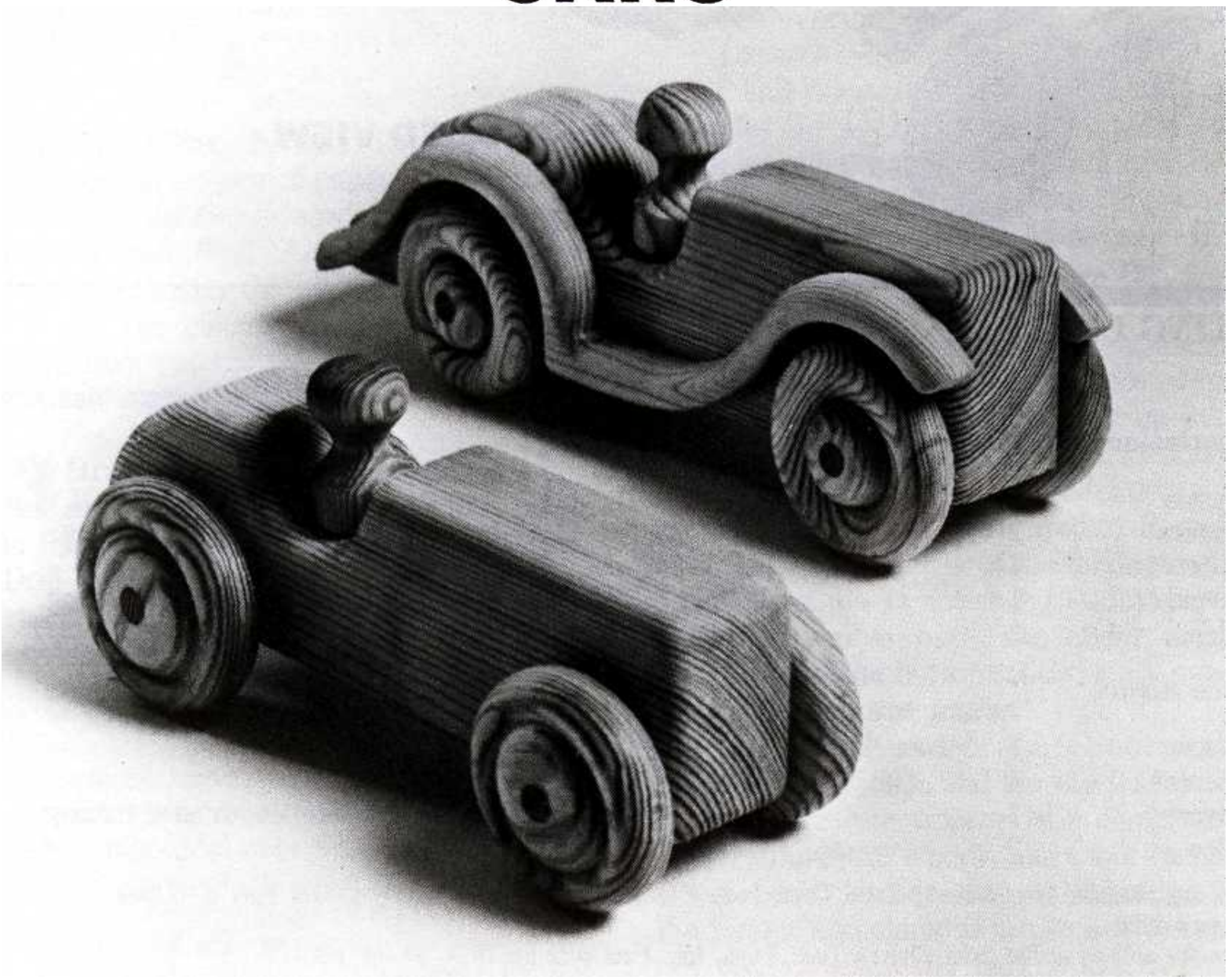
RACE CARS



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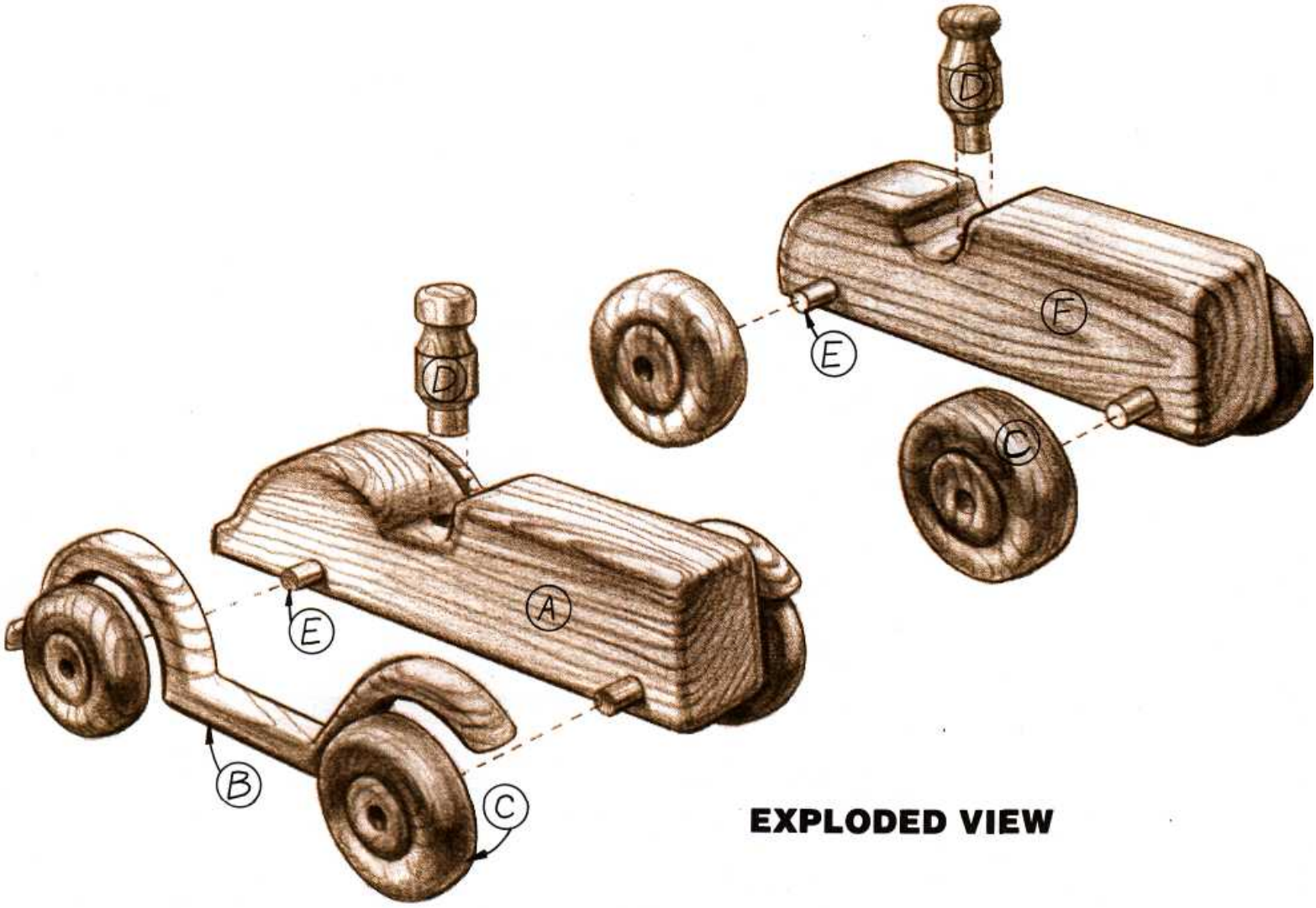

EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension	Comment
#1 Gentleman's Roadster			
A. Chassis	1	1¾″ × 2¾″ × 11″	
B. Fenders	2	¾″ × 3½″ × 11½″	Cut to size when shaping.
C. Wheels*	4	¾″ × 2½″ dia.	
D. Driver†	1	1″ dia. × 3½″	Cut to length after turning.
E. Axles	2	⅜″ dia. × 3⅜″	
#2 Race About			
F. Chassis	1	1¾″ × 2¾″ × 9¾″	
C. Wheels*	4	¾″ × 2½″ dia.	
D. Driver†	1	1″ dia. × 3½″	Cut to length after turning.
E. Axles	2	⅜″ dia. × 3⅜″	

*Wheels are available from Cherry Tree Toys, Inc., P.O. Box 369, Belmont, OH 43718. Part #16 (oak, cherry, or walnut).
†Drivers are also available from Cherry Tree Toys, Inc. Part #22 for ⅞ × 2⅜-in. person.

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1 Select the stock and cut the parts. The race cars shown are made of pine, but you can make yours out of almost any kind of wood. To add color and variety to the race cars, use various wood species for the different parts. Because these cars are basically the same, why not make both at once? Choose enough straight, flat stock to make both cars. Joint, plane, rip, and cut the stock to the sizes given in the Cutting List.

SHOP TIP: If you glue up stock for the chassis, consider gluing together different types of wood to get racing stripes. This project, like any other, takes on a whole new look with different types of wood.

2 Shape the chassis. Draw a ½-inch grid on a piece of paper and draw the chassis of the *Gentleman's Roadster Shape Pattern* and *Race About Shape Pattern* onto it. Transfer the patterns to the stock and cut the chassis to shape on a band saw. After you cut the chassis, sand away the saw marks.

3 Drill the axle holes in the chassis. Mark and drill 7/16-inch axle holes in the chassis, as shown in the patterns. Drill the holes all the way through the stock.

SHOP TIP: When drilling a hole completely through a piece of wood, the wood often splinters where the bit exits the stock. To prevent this from happening, put a flat piece of scrap under the stock you are drilling. As the drill comes through the stock, the piece of scrap will support the edges of the hole and prevent it from splintering.

4 Round the edges of the chassis. Put a ¼-inch roundover bit in your router. Secure the router in a router table and round-over all of the edges of the chassis except where noted otherwise in the *Shape Pattern.* Use a push stick when routing and keep your fingers well away from the cutters.

5 Cut out and glue the fenders to the Gentleman's Roadster. Note that only the Roadster has fenders. While both of the Roadster's fenders are made from the same pattern, they are not identical. The right fender is rounded over on the right side; the left fender is rounded over on the left side.

Draw a ½-inch grid on a piece of paper and draw the fender shape onto it. Transfer the pattern to the two pieces of stock as called for in the Cutting List.

Start by cutting along the "first cut" line of the fender shapes, as noted in the *Shape Pattern,* and sand away the saw marks.

When the first cuts have been sanded smooth, round-over the appropriate edges with a ½-inch roundover bit set up in a table-mounted router. Remember: Round-over the left side of the left fender and the right side of the right fender. Round-over the square corner of the fenders with a chisel and file as noted in the drawing.

After you've routed the fender, make the cut along the bottom of the fender and sand away the saw marks.

Lay the chassis of the Gentleman's Roadster on its side and set the wheels in place. Place the appropriate completed fender above the wheels and mark its position. Spread some glue on the edge of the fender and clamp it in place with rubber bands. When the glue is dry, repeat the process with the second fender.

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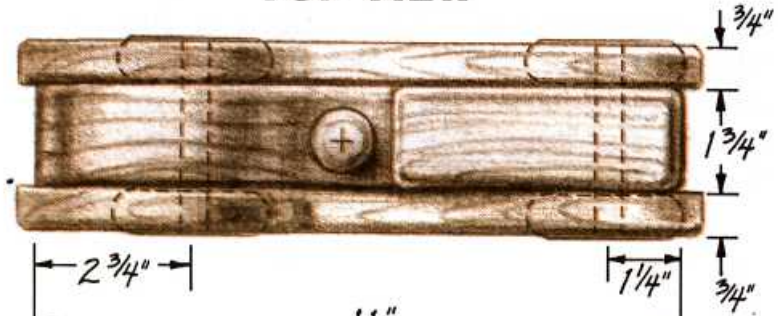
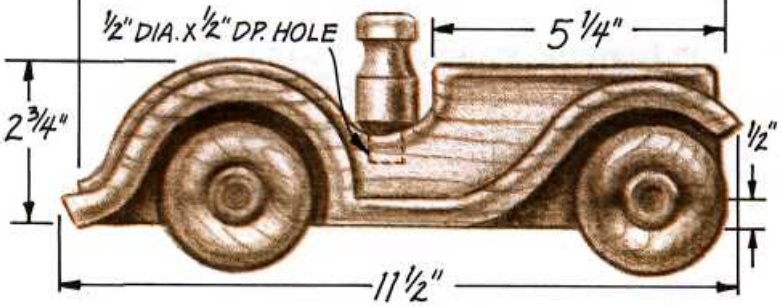
GENTLEMAN'S ROADSTER

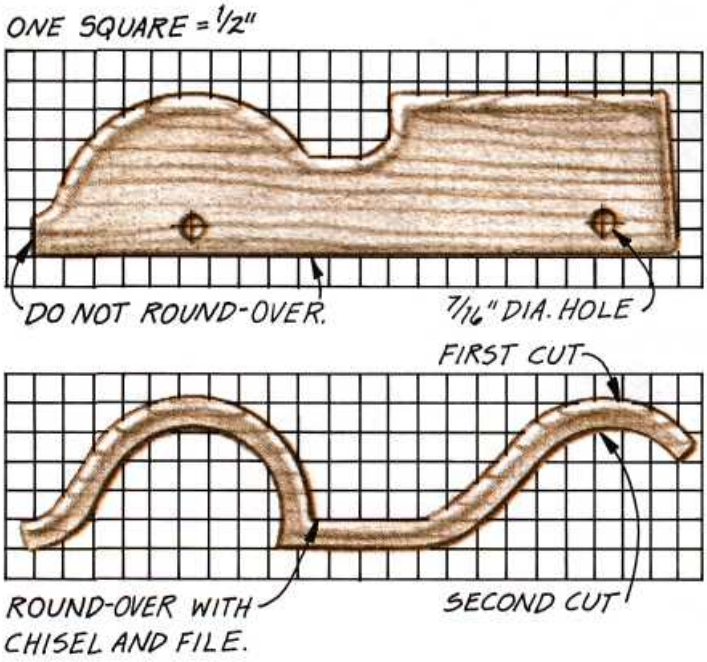
TOP VIEW



SIDE VIEW

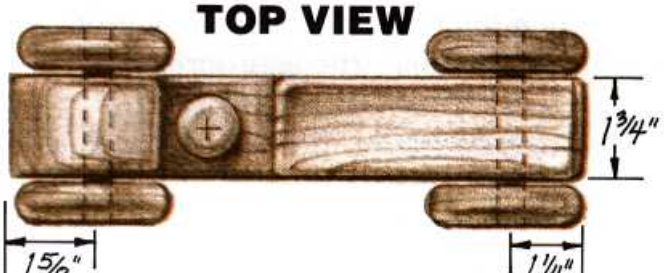


SHAPE PATTERN

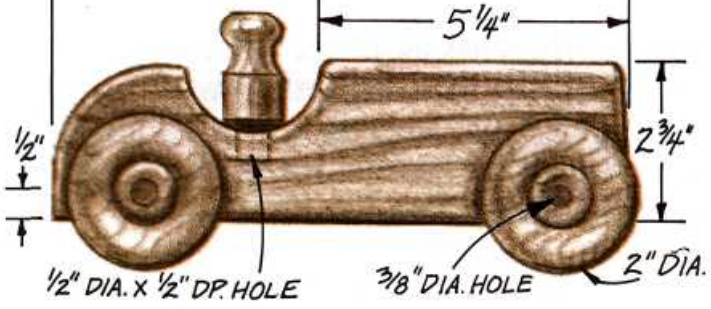


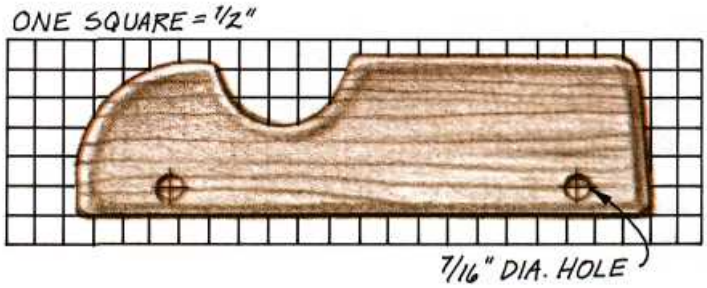
RACE ABOUT

TOP VIEW

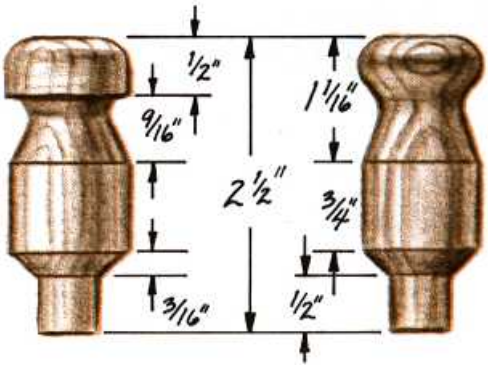


SIDE VIEW





DRIVER DETAIL



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6 Purchase the drivers or turn them on the lathe. You can purchase drivers from the source listed in the Cutting List or turn them yourself on the lathe. If you decide to turn them yourself, turn the drivers to the dimensions shown in the *Driver Detail.* Sand the drivers while still on the lathe. When the drivers are turned and sanded, turn off the lathe, remove the drivers, cut off the tail stock with a backsaw, and sand the ends smooth.

If you are new to turning and want to give it a try, a good reference guide is *Creative Woodturning* by Dale L. Nish.

7 Drill the holes for the drivers in the chassis. If you turned the drivers to the specifications given, drill holes for your drivers in the chassis, as shown in the *Gentleman's Roadster, Side View* and *Race About, Side View.*

If you purchased the drivers from the source listed, drill a ⅞-inch-diameter hole, instead of the ½-inch-diameter hole indicated.

If you want to fasten the drivers to the chassis, simply glue them in place.

8 Sand and finish the chassis and drivers. Finish sand the chassis and drivers and remove any excess glue from the surface of the wood. As you sand, slightly round-over any sharp edges.

Give the chassis a coat of varnish and let the wood grain show through or paint them with stripes and racing numbers.

Allow the finish to dry.

9 Add the axles and wheels to the race cars. Glue one wheel to each axle. Lubricate the portion of the axle that will contact the chassis by rubbing some candle wax on it. Put the axles through the chassis and glue on the other wheels. Make sure that the wheels are not tight against the chassis, or they won't be able to turn. After all, a race car isn't much good if its wheels won't turn.

Allow the glue to dry, and you're off to the races.

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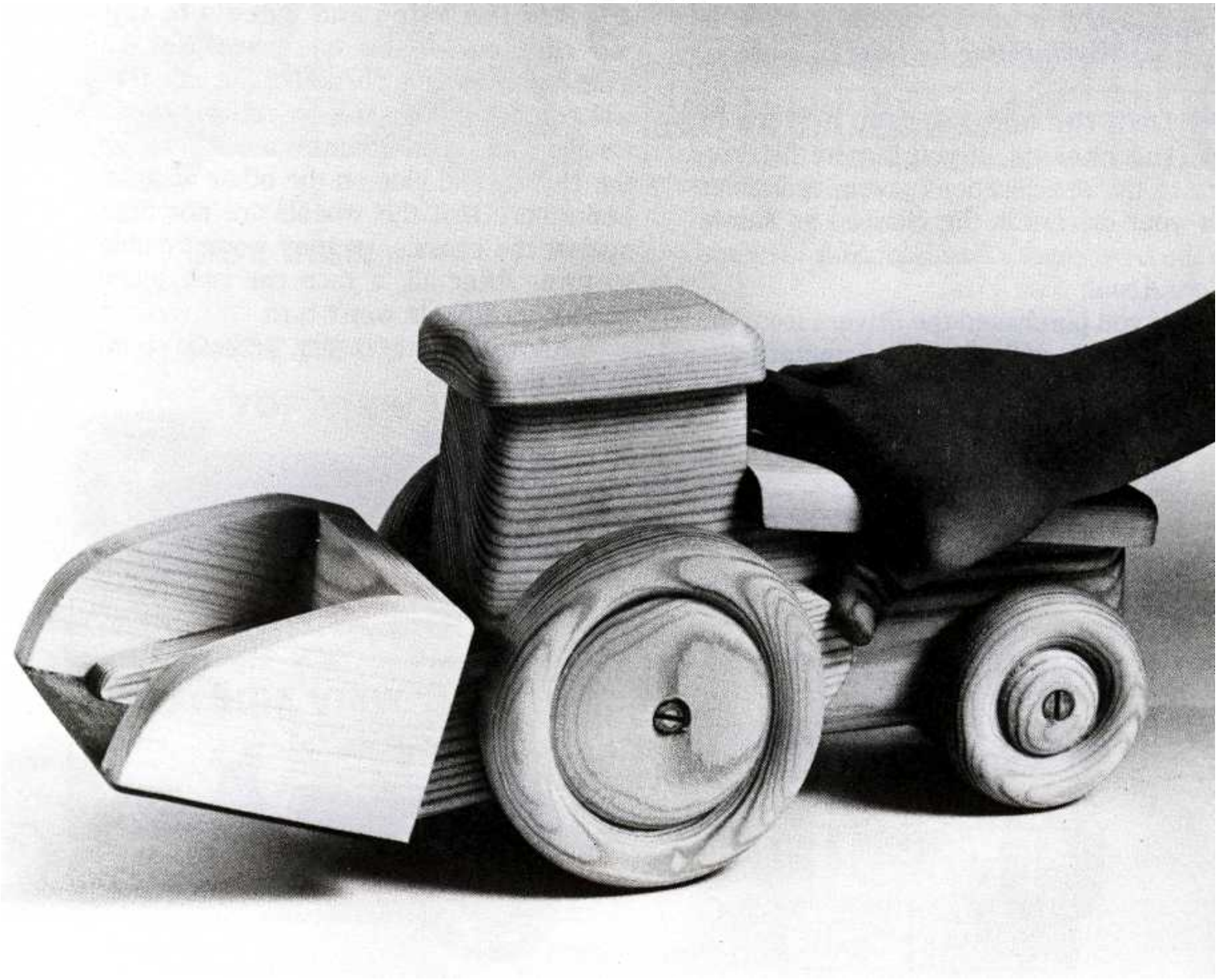
FRONT-END LOADER



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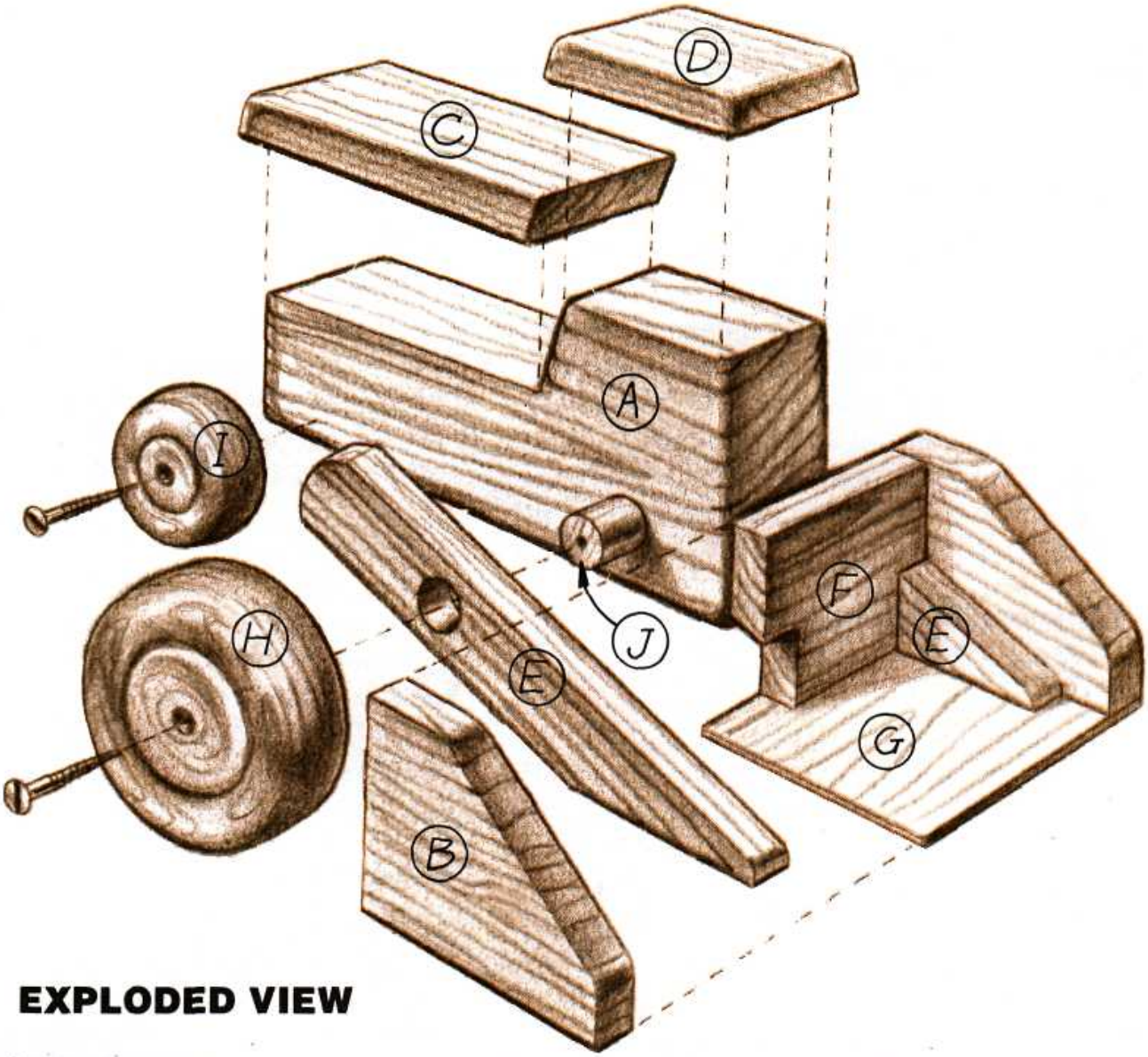

EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Body	1	1¾″ × 3¾″ × 7½″	
B. Bucket sides	2	⅝″ × 2⅝″ × 3⅛″	
C. Engine cover	1	⅝″ × 2¼″ × 4¾″	
D. Cab roof	1	⅝″ × 2¼″ × 3⅛″	
E. Bucket arms	2	⅝″ × 1⅜″ × 7⅛″	
F. Bucket back	1	⅝″ × 2⅝″ × 3 1⁄16″	
G. Bucket bottom	1	1⁄16″ × 3⅛″ × 4 5⁄16″	Plastic laminate
H. Front wheels	2	1″ × 3⅜″ dia.	
I. Rear wheels	2	⅞″ × 2⅜″ dia.	
J. Axle	1	¾″ dia. × 3 1⁄16″	

Hardware

4 #12 × 1½-in. flathead wood screws
As needed, 4d finishing nails

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1 Select the stock and cut the parts. The loader can be made of softwood, as shown in the photo, or hardwood—perhaps making different parts with hardwood scraps of different colors. For durability, the bottom of the bucket is made of a plastic laminate. If you don't have a scrap laying around, substitute ⅛-inch tempered hardboard. Joint, plane, rip, and cut all the parts except the wheels to the sizes given in the Cutting List.

SHOP TIP: When you're making a project with lots of small parts, do as much work as possible on larger pieces of stock, then cut the smaller ones from it. On this project, cut all the ⅝-inch-thick parts for the loader from a single board 3 × 36 inches. Planing one long board to correct thickness is easier—and safer—than planing lots of short pieces.

2 Shape the body and bucket sides. Draw a ¼-inch grid on a piece of paper and draw the *Body Detail* and *Bucket Side Detail* onto it. Transfer the patterns to the stock and cut the parts to shape on a band saw.

3 Bore the hole for the axle. Lay out and drill a 13/16-inch-diameter axle hole in the body, as shown in the *Body Detail.* Put a flat piece of scrap under the stock you are drilling. As the drill comes through the stock, the piece of scrap will support the edges of the hole and prevent it from splintering.

4 Bevel the engine cover. Bevel the end of the engine cover to fit against the back of the cab. Set your table saw blade to 13 degrees and guide the cut with the miter gauge set at 90 degrees. Test fit the engine cover to the body and adjust the bevel if necessary.

5 Round-over the edges of the body, cab roof, and engine cover. Put a ¼-inch roundover bit in your router. Secure the router in a router table and rout the appropriate edges of the body, cab roof, and engine cover. Edges to be routed are shown in the *Side View* and *Bottom View.*

6 Assemble the chassis. Glue the cab roof and engine cover to the body. Clamp them securely and allow the glue to dry.

Sand and finish the chassis.

SHOP TIP: Pieces assembled with glue only often slip around when you use clamps. To prevent this, position the pieces exactly, drive thin brads into the body, and clip them off ⅛ inch or so above the surface. Press the mating surface onto the brads with clamps: The brads keep the parts from slipping.

7 Make the bucket arms. Lay out and drill 13/16-inch axle holes in the bucket arms. Then lay out and cut the angle on the end of the arms with the band saw, as shown in the *Side View.* Cut the radius shown in the opposite end on the band saw and sand any saw marks or roughness smooth.

8 Cut the bucket arm notches. The bucket arms run through the bucket back. Lay out and notch the bucket back for the arms, as shown in the *Side View*

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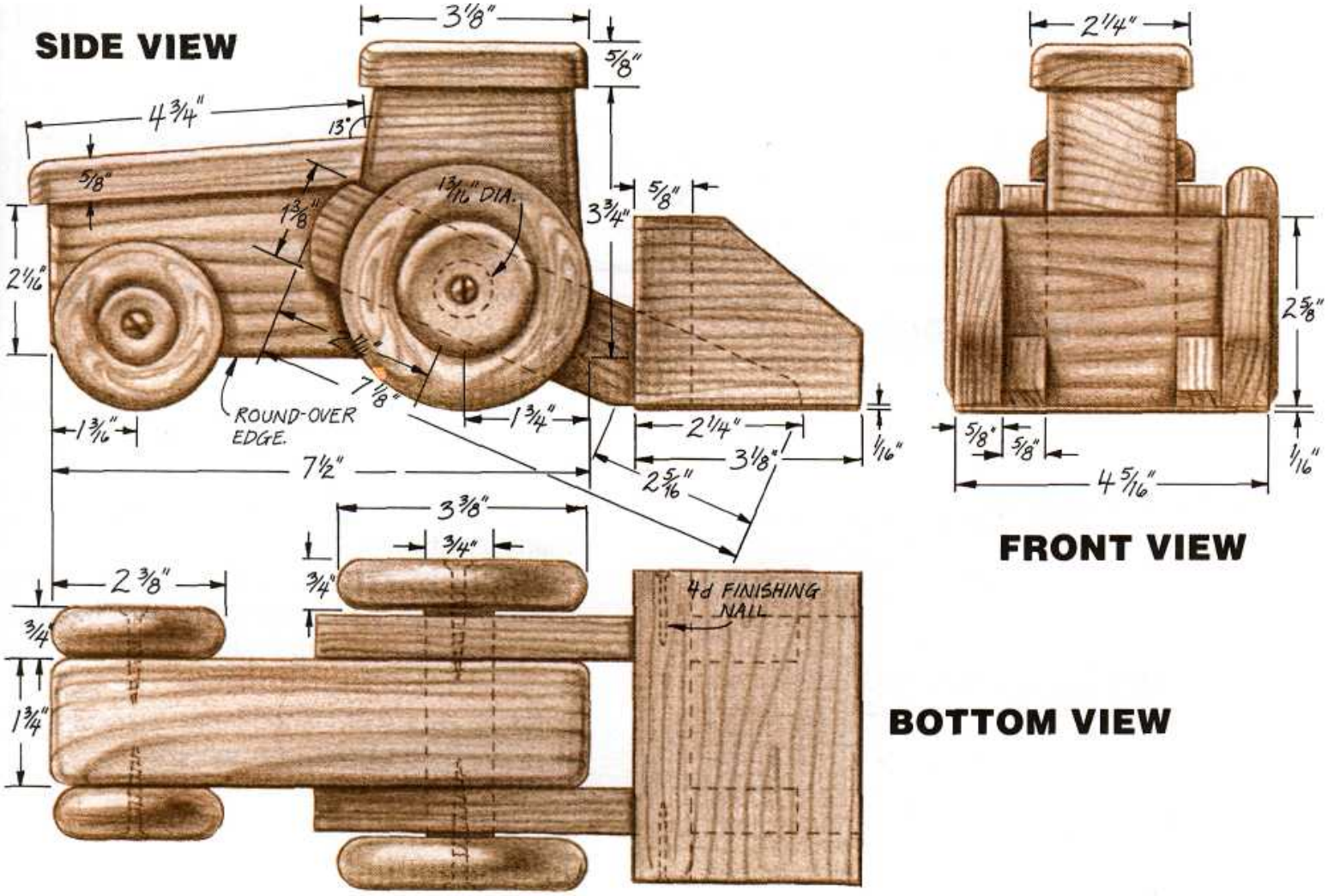

and *Front View.* Note that the top of the notch is angled. It's quicker to cut the notch with a backsaw or dovetail saw than to set up a machine to cut them. Make sure both notches are the same size and angle.

9 Assemble the bucket. Glue and clamp the bucket sides, back, and bottom together. For wood-to-wood joints, white or yellow glue is fine, but epoxy the bottom of the bucket in place if you are using plastic laminate.

When the glue has dried, slip the bucket arms into the notches in the bucket back. If there's any difference between the notches, you'll notice it now. Remove the bucket and trim the notches with a chisel until they fit correctly. Then apply glue to the mating surfaces of the arm and bucket and clamp them together. Secure the sides and back to the bucket arms by driving 4d finishing nails through the sides and bucket arms and into the back. Sand and finish the bucket.

10 Make the wheels. If you have a lathe, you can turn the wheels. Mount band-sawn blanks onto a small faceplate and shape them as indicated in the *Cross Section through Wheels.*

The wheels are attached to the body by #12 × 1½-inch flathead wood screws. Drill ¼-inch axle screw holes in the center of each of the wheels and countersink the holes.

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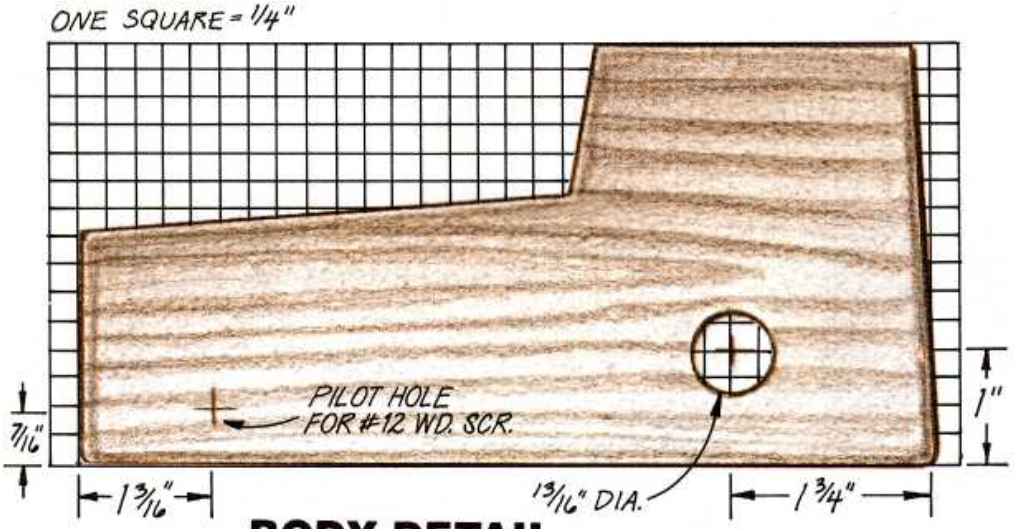
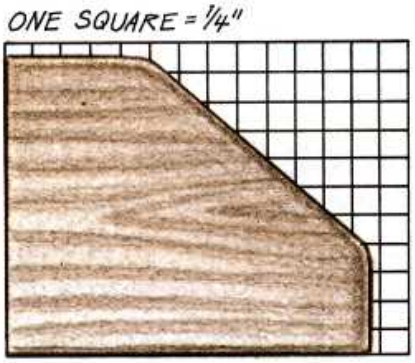
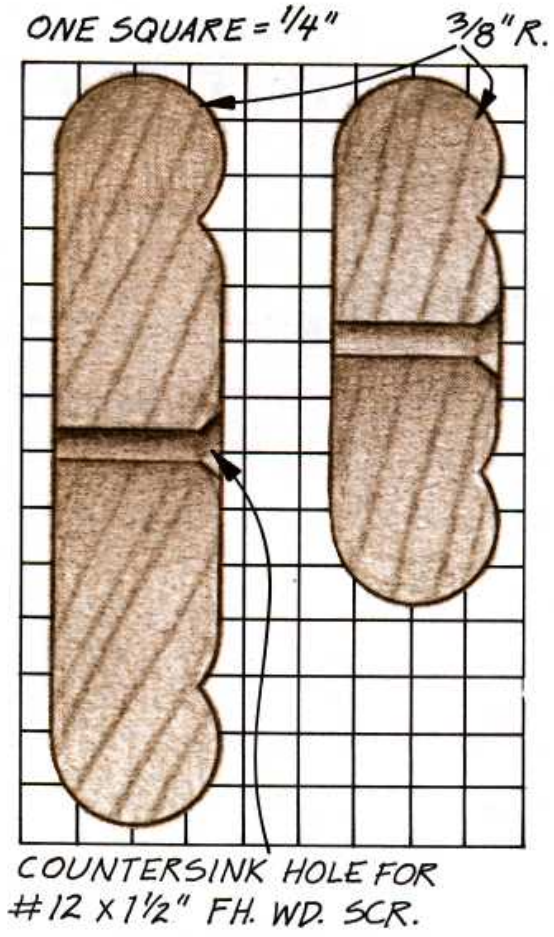


BODY DETAIL



BUCKET SIDE DETAIL



CROSS SECTION THROUGH WHEELS

If you don't have a lathe, consider buying a wheel and circle cutter for your drill press. This special cutter can cut wheels from 1 to 6 inches in diameter. Wheel and circle cutters are available from Woodcraft, 210 Wood County Industrial Park, P.O. Box 1686, Parkersburg, WV 26102. You can also find these cutters in many hardware stores.

Still another option is to purchase wooden wheels from a craft store, but the dimensions may differ slightly. If you do purchase the wheels, adjust the dimensions of your front-end loader accordingly.

Sand and finish the wheels.

11 Assemble the front-end loader. First, drill 9/64-inch-diameter pilot holes for the axle screws. Drill a pilot hole for the front wheels centered on each end of the axle. Drill a hole for the rear wheels in each side of the body, as shown in the *Body Detail.*

Next, wax the axle with paste wax and screw one of the front wheels securely to it. Then, put the bucket arms in place on either side of the body and slide the axle through the bucket arms and body. Screw the remaining front wheel to the axle.

When the front wheels, axle, and bucket are in place, screw the back wheels to the sides of the body. Don't drive these screws in all the way. The back wheels must rotate freely on the screws.

Do any necessary touch up sanding and finishing.

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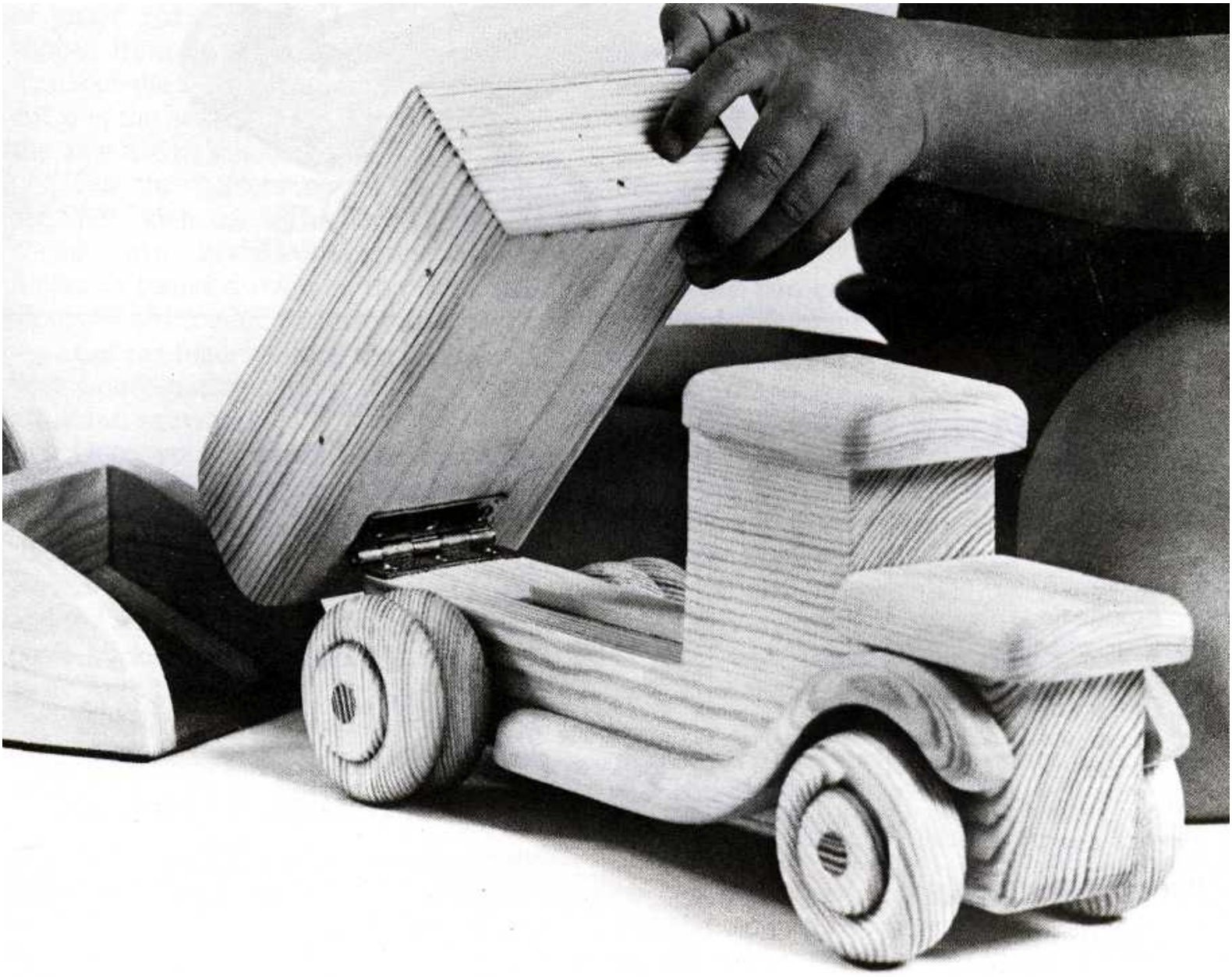
DUMP TRUCK



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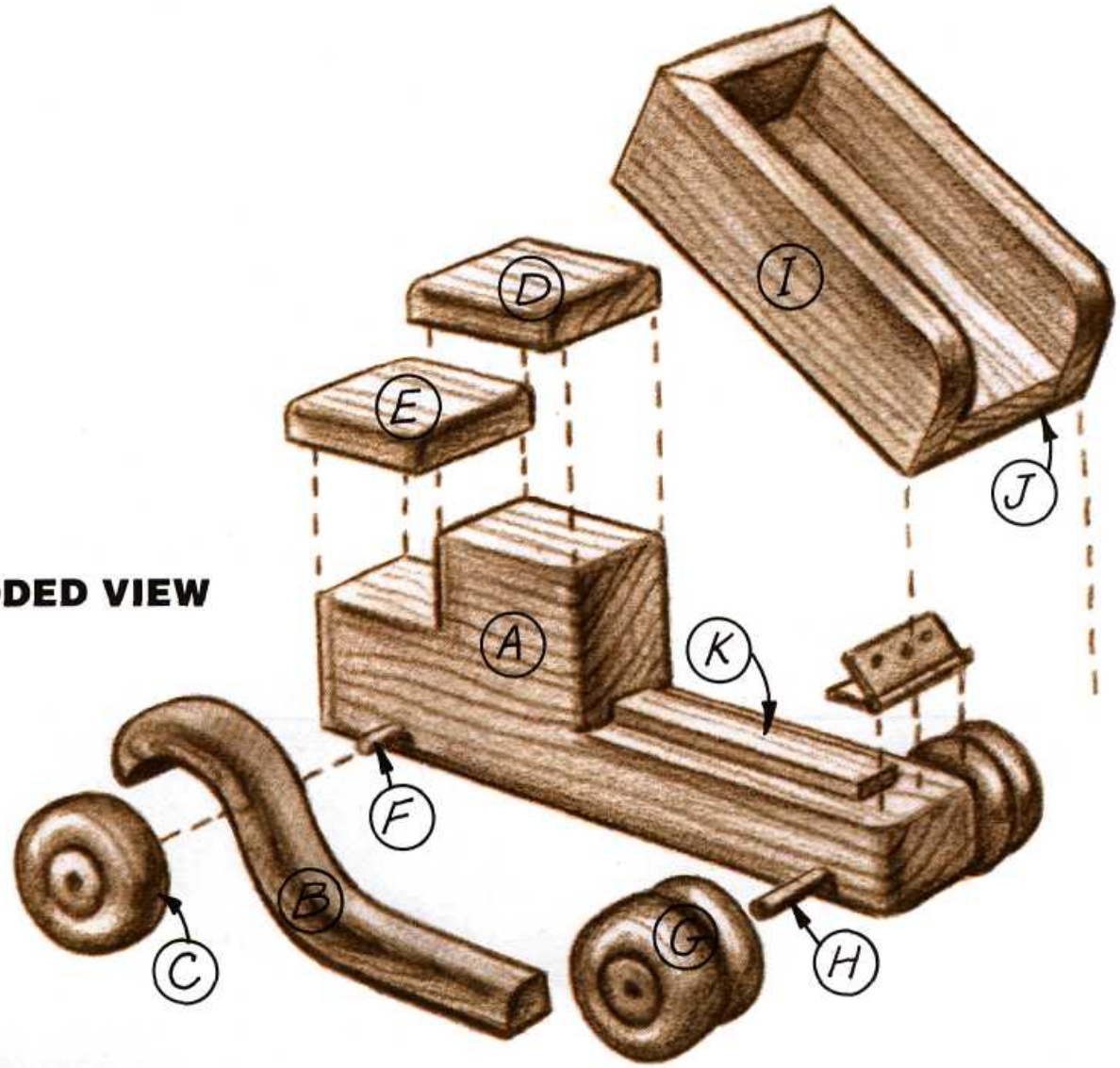

EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Body	1	1¾" × 3¾" × 9¾"	
B. Fenders	2	⅝" × 5" × 6¾"	
C. Front wheels*	2	¾" × 2" dia.	
D. Cap	1	⅝" × 2¼" × 2⅝"	
E. Hood	1	⅝" × 2¼" × 2½"	
F. Front axle	1	⅜" dia. × 3⅜"	
G. Rear wheels*	4	½" × 2" dia.	
H. Rear axle	1	⅜" dia. × 3⅞"	
I. Dump sides/back	1	⅜" × 1¾" × 16"	Makes 3 pieces; miter to fit.
J. Dump bed	1	⅝" × 2¾" × 5¾"	
K. Spacer	1	½" × ¾" × 4"	Rip to thickness of closed hinge.

*Wheels are available from Cherry Tree Toys, Inc., P.O. Box 369, Belmont, OH 43718. Part #14 for front wheels and part #28 for rear wheels.

Hardware

1 1½-in. butt hinge

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1 Select the stock and cut the parts. The dump truck shown here is made of pine, but you can make yours from any wood you have on hand. Choose straight, flat stock. Joint, plane, rip, and cut all of the parts, except the spacer, to the sizes given in the Cutting List. You may need to glue a couple of pieces together for the body. Purchase the wheels from the source given in the Cutting List.

2 Cut the body and fenders to shape. Draw a ¼-inch grid on a piece of paper and draw the body and fender shapes from the *Cutting Pattern* onto it. Transfer the body pattern to the wood and cut out the body on the band saw. Sand the saw marks smooth.

Cut the fenders next. The fenders are not identical: The left fender is rounded over on the left side and the right fender is rounded over on the right side. Transfer the fender pattern to the stock.

Cut the fenders along the line marked "cut first" in the *Cutting Pattern.* Sand away the saw marks.

Once you've sanded the first cuts, round-over the appropriate edge. Put a ½-inch roundover bit in your router. Secure the router in a router table. Remember: Round-over the left edge of the left fender and the right edge of the right fender. Use push sticks and keep your fingers well away from the cutter.

When you've rounded-over the fenders, cut along the bottom of the fenders and sand away any saw marks.

3 Drill the axle holes in the body. Drill 7/16-inch axle holes in the body, as shown in the *Cutting Pattern.* These holes go all the way through the body.

When drilling a hole completely through a piece of wood, the wood often splinters where the bit exits the stock. To prevent this from happening, put a flat piece of scrap under the stock you are drilling. As the drill comes through the stock, the piece of scrap will support the edges of the hole and prevent it from splintering.

4 Glue the fenders in place. Lay the body of the dump truck on its side and set the front wheels in place. Set the appropriate completed fender in place and make sure that it doesn't interfere with the wheel. Mark the fender's position. Spread some glue on the fender's inside edge, put it on the body, and clamp it in place with rubber bands. When the glue is dry, repeat the process with the second fender.

5 Glue the cap and hood to the body. To round-over the edges of the cap and hood, put a ½-inch roundover bit in your router. Secure the router in a router table. Round-over all the top edges of the cap, but only the front and sides of the hood. Use push sticks and keep your fingers away from the cutter.

Spread glue on the bottom of the cap and hood and position them as shown in the *Top View* and *Side View.* Clamp them in place with some strong rubber bands and allow the glue to dry.

6 Attach the axles and wheels to the body. Glue one ¾-inch-wide wheel to the front axle. Lubricate the portion of the axle that will contact the body by rubbing some candle wax against it. Put the axles through the body and glue on the other ¾-inch-wide wheel. Make sure that the wheels are not tight against

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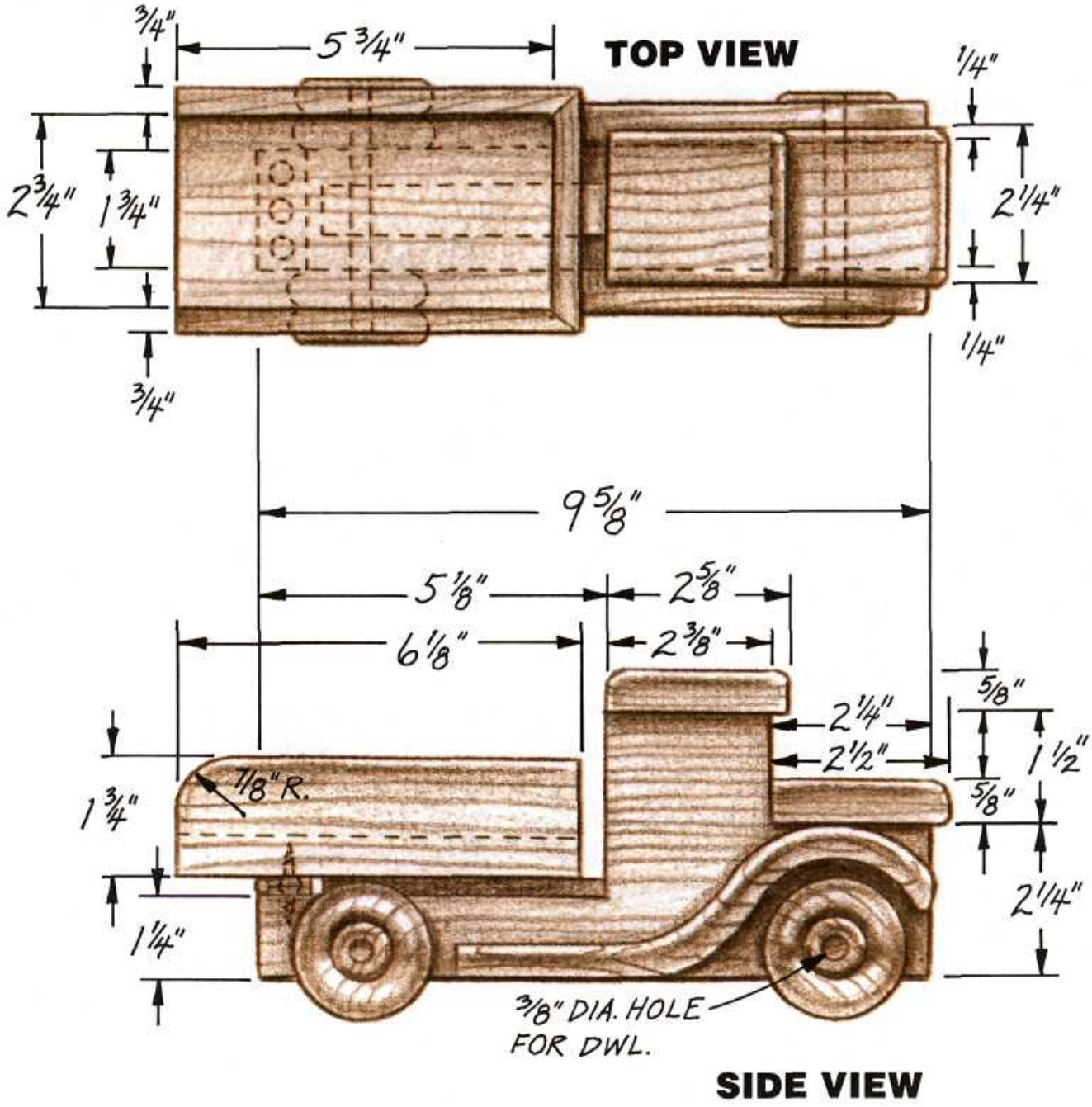

the body, or they won't turn.

Glue two of the ½-inch-wide wheels side by side on one end of the back axle, as shown in the *Top View.* Rub some candle wax on the axle and put the axle through the body. Glue the two remaining wheels to the axle and make sure that they can turn freely.

Allow the glue to dry.

7 Miter and shape the dump sides and back. Miter the dump sides and back to fit around the dump bed. Set the table saw blade to 45 degrees and guide the cuts with a miter gauge set at 90 degrees. Test fit the dump sides and back as you go.

To get accurate miters, check your mitering setup on some pieces of scrap. Put the miters together and make sure that the resulting angle equals 90 degrees. Adjust the blade as necessary.

Round the corners of back ends of the sides to approximate the shape shown in the *Side View.* Round the corners with

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a band saw or jigsaw and sand the saw marks smooth.

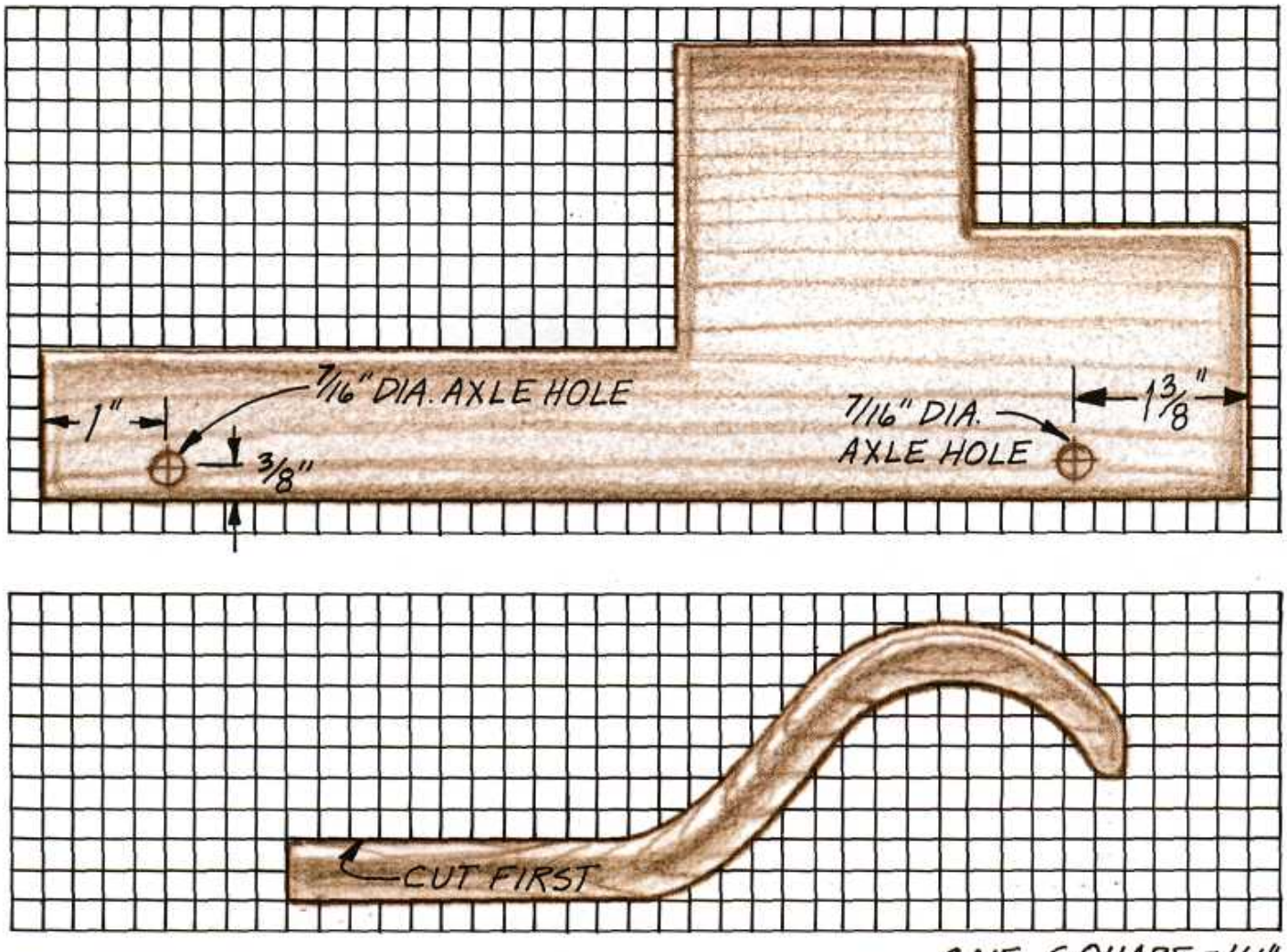
8 Measure, rip, and attach the spacer to the body. A spacer, between the dump and the body, supports the dump. Immediately behind the spacer, the dump and body are hinged together. The thickness of the spacer depends on the thickness of the hinge. Measure the closed thickness of the hinge and rip the spacer to this measurement on a table saw. Glue the spacer in place on the body, as shown in the *Top View.*

9 Hinge the dump to the body. Position the hinge, as shown in the *Top View,* and screw it in place.

10 Apply the finish. Finish sand all of the exposed surfaces of the dump truck.

When the dump truck has been sanded, you can give the truck a coat of varnish like the dump truck shown. You could also paint your truck and add details like headlights, windows, and a company logo.

CUTTING PATTERN



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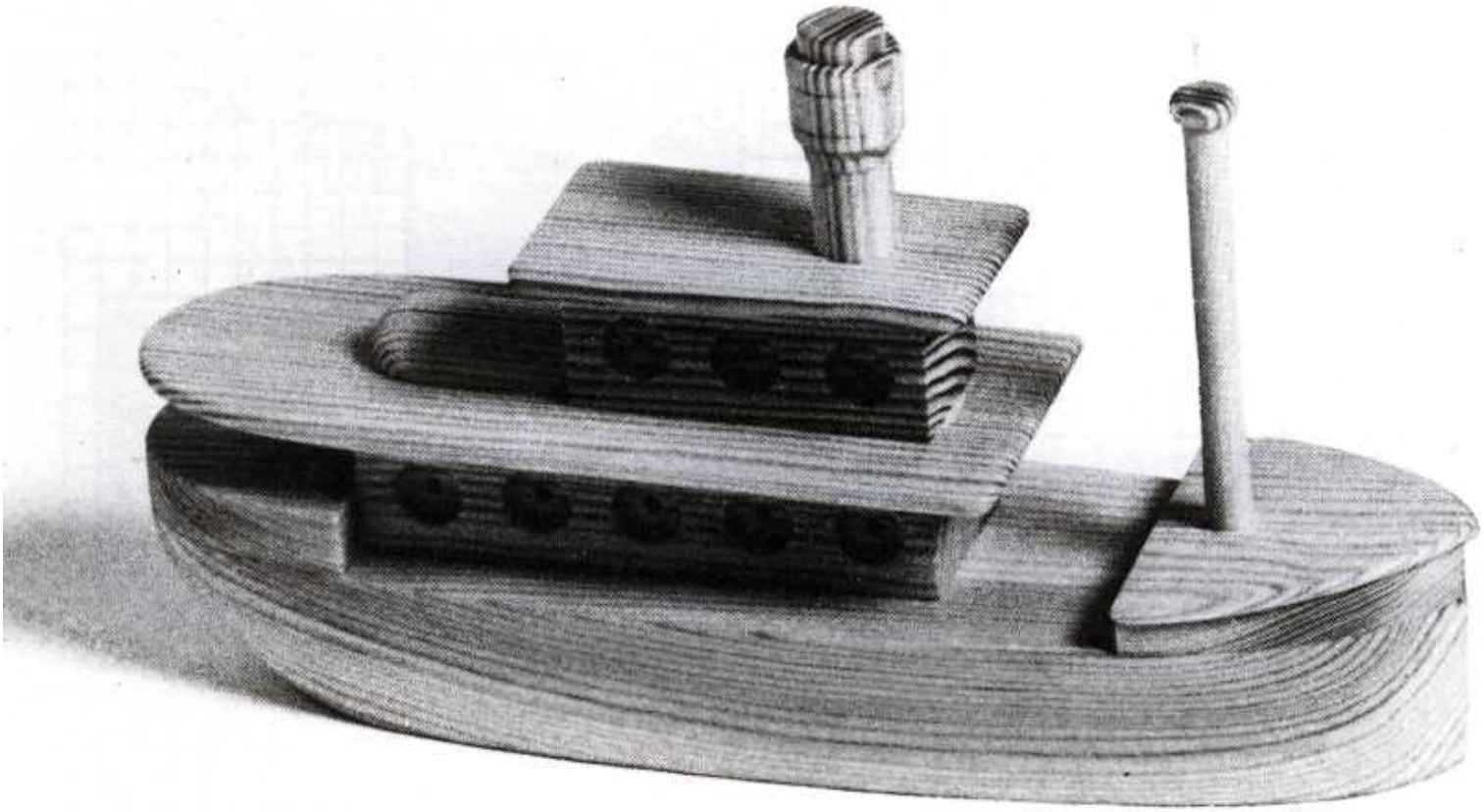
PLEASURE BOAT



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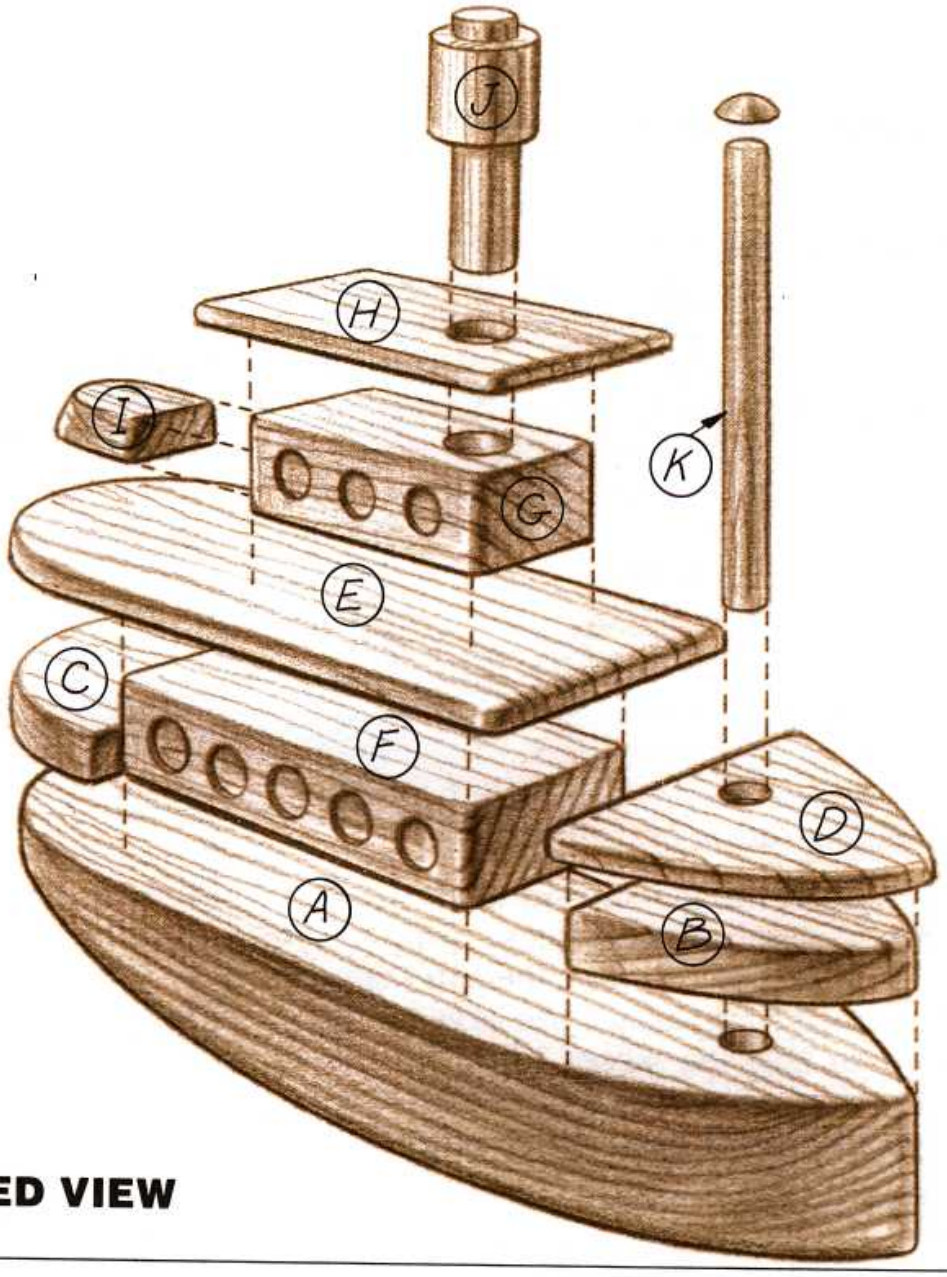

EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Hull	1	1 9/16″ × 3½″ × 11½″	
B. Foredeck	1	⅝″ × 3″ × 2½″	
C. Aft deck	1	⅝″ × 2¾″ × 2″	
D. Foredeck cap	1	3/16″ × 3¼″ × 2¾″	Cut to shape and length.
E. Top deck	1	3/16″ × 3½″ × 7⅜″	
F. Cabin	1	1⅛″ × 2⅛″ × 5″	
G. Wheelhouse	1	1⅛″ × 1¾″ × 3¼″	
H. Wheelhouse roof	1	3/16″ × 2⅛″ × 3¾″	
I. Ventilator cap	1	½″ × 1″ × 5″	Cut to length after shaping.
J. Smokestack*	1	⅞″ dia. × 3″	Cut to length after turning.
K. Mast*	1	½″ dia. × 5″	Cut to length after turning.

*Similar parts are available from Cherry Tree Toys, P.O. Box 369, Belmont, OH 43718. Specify smokestack #6 and headlamp #54 for top of mast.

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1 Select the stock and cut the parts. Joint, plane, rip, and cut the parts to the sizes given in the Cutting List. It's safest to work with boards that are at least 15 inches long, particularly as you joint and plane the stock.

Cut small pieces like these on the band saw: You can rip them to width without danger of the saw kicking the piece back at you.

2 Make a pattern for the hull. Draw a ½-inch grid on a piece of paper and draw the hull shape onto it, as shown in the *Top View.* Transfer the pattern to what will be the *bottom* of the boat.

3 Attach the foredeck and aft deck. It's easier to glue these parts together before you've sawn them to shape. If you don't have clamps, use large rubber bands to hold the pieces while the glue dries. If you're planning to sail the boat, use a waterproof glue, like resorcinol.

4 Shape the assembled hull. Draw a ½-inch grid on a piece of paper and draw the stern profile onto it, as shown on the *Side View.* Transfer the stern profile to the hull and cut out the shape. Flip the boat upside down on the band saw and cut along the layout lines you drew there earlier. Remove the saw marks and finish shaping with files and sandpaper.

5 Make the foredeck cap. Position the straight back edge of the cap so it overhangs the foredeck by ⅛ inch. Then trace the shape of the foredeck onto the cap. Hold the side of the pencil flat against the hull and foredeck as you trace. The thickness of the pencil automatically creates the overhang of the cap. Cut to the line on the band saw. Sand to remove any saw marks and glue the cap in place.

6 Make the top deck. Trace around the hull to establish the shape of the top deck. The top deck does not overhang the hull: Draw the deck so that it is the same size as the section of hull below it. Cut to shape as before.

7 Make the portholes. Mark the centerlines for the portholes on the cabin and wheelhouse, as shown in the *Side View.* Bore holes ⅛ inch deep with a ⅝-inch bit.

8 Assemble the superstructure. Glue the cabin, top deck, wheelhouse, and wheelhouse roof in place on the hull. Note that they're all centered across the hull's width.

9 Make the ventilator cap. To rout the roundover on both long edges of the ventilator cap stock, put a ½-inch roundover bit in your router. Secure the router in a router table and guide the stock against a fence. Round the end grain on one end to a ½-inch radius with a file and sandpaper. Cut to length. Glue the cap in place on the top deck.

10 Add the smokestack and mast. Turn the mast and smokestack to the profile shown. If you don't have a lathe, substitute a similar chimney, available from the source listed in the Cutting List. To make the mast, epoxy a wooden headlamp, available from the same source, on top of a dowel.

11 Add the finishing touches. Clean off any excess glue with a sharp chisel. Round-over any sharp edges of the boat with sandpaper. You can paint the boat or seal it with a clear finish.

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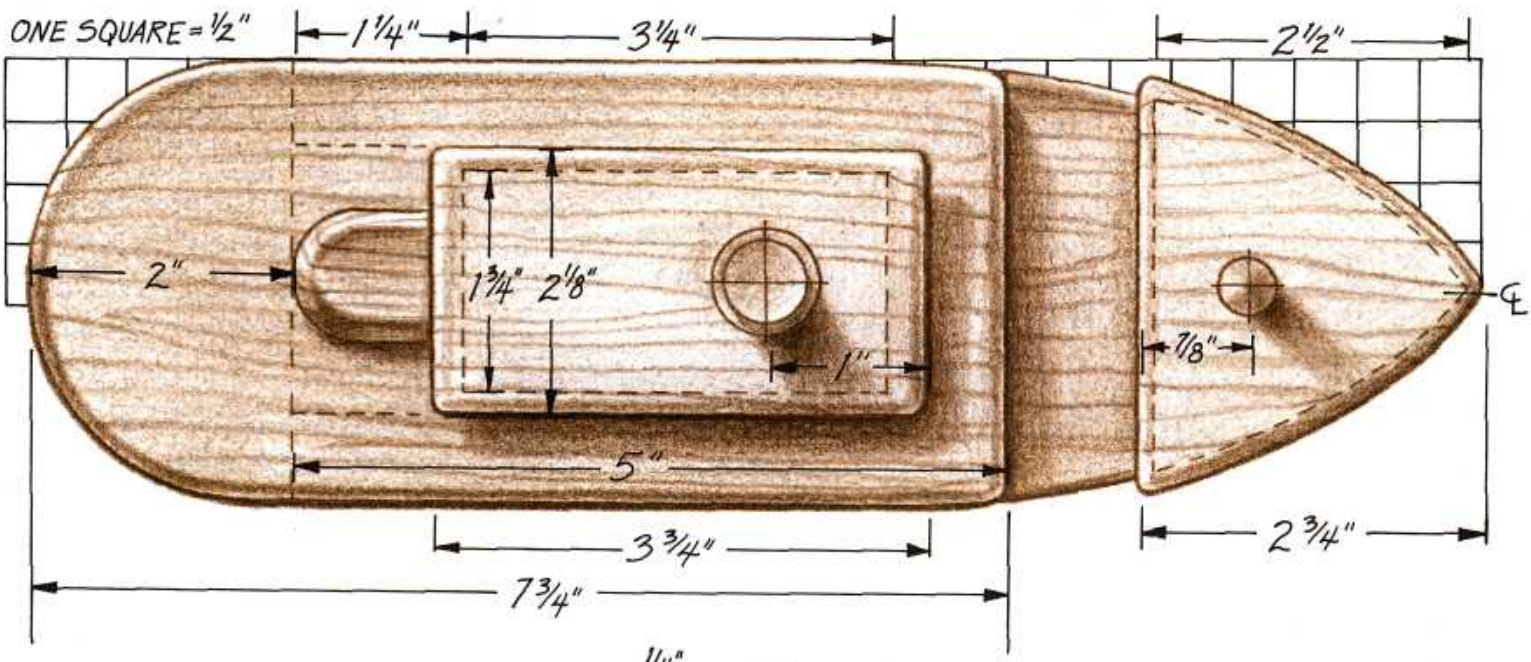
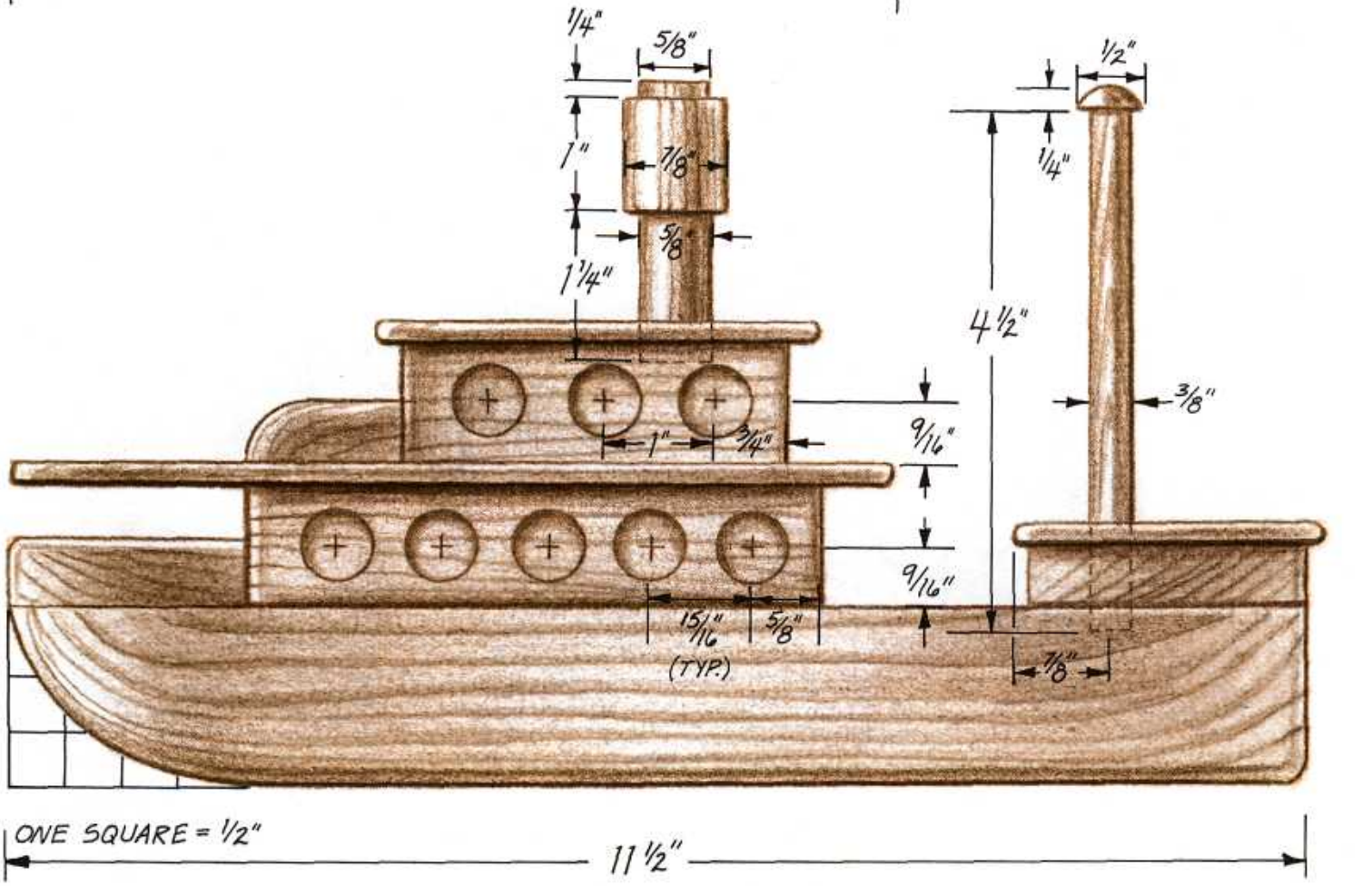
TOP VIEW





SIDE VIEW

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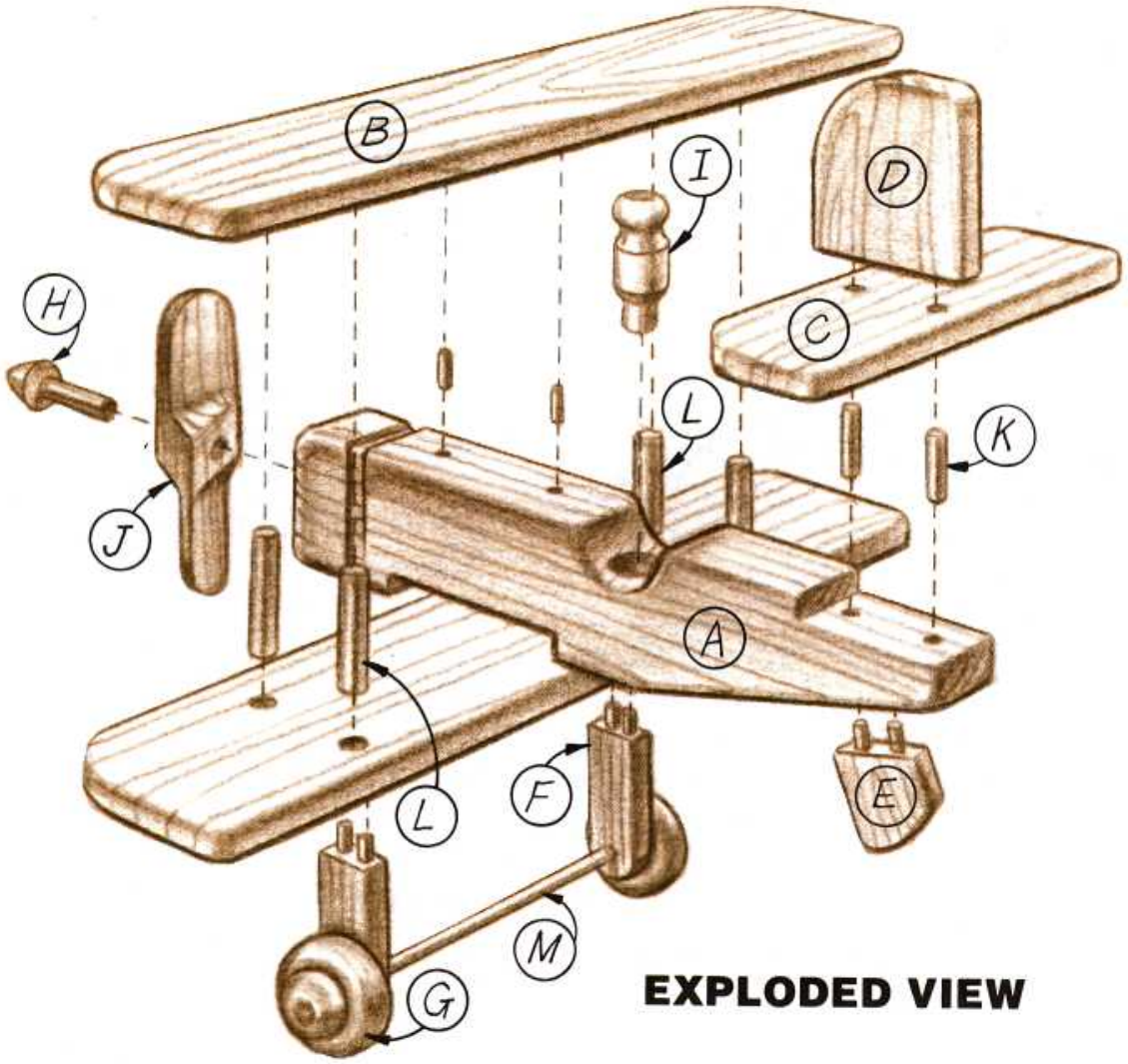
BIPLANE



EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Fuselage	1	1⅜″ × 2¾″ × 13½″	
B. Wings	2	9/16″ × 3¾″ × 15″	
C. Tail wing	1	9/16″ × 2¾″ × 6″	
D. Tail fin	1	9/16″ × 2¾″ × 3¼″	
E. Tail support	1	9/16″ × 1½″ × 2″	
F. Axle supports	2	9/16″ × 1 5/16″ × 2⅞″	
G. Wheels*	2	¾″ × 2″ dia.	
H. Prop shaft*	1	1″ × 1″ × 3″	Cut to length after turning.
I. Pilot*	1	1″ × 1″ × 3″	Cut to length after turning.
J. Propeller	1	¾″ × 1 3/16″ × 6½″	
K. Dowel stock	1	¼″ × 12″	For dowel joints
L. Wing struts	4	½″ dia. × 2¾″	Dowel
M. Axle	1	½″ dia. × 7¾″	Dowel

*Available from Cherry Tree Toys, P.O. Box 369, Belmont, OH 43718. Specify person #22 for pilot, multiuse peg #53 for prop shaft, and part #16 for ¾-in.-thick × 2½-in.-dia. wheel (oak, cherry, or walnut).

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1 Select the stock and cut the parts. Choose straight, flat wood without knots. Joint, plane, rip, and cut the parts to the sizes given in the Cutting List.

2 Cut the fuselage, wings, tail wing, tail fin, and tail support to the shapes shown. Draw a ½-inch grid on a large piece of paper and draw the fuselage, wing, tail wing, tail fin, and tail support shapes on it, as shown in the *Cutting Pattern.* Transfer the shapes to the wood and cut the parts to shape with a band saw or jigsaw. Remember to make two wings that are the same shape.

To get two identical wings, cut both at once. First stack the wing stock together and secure by putting double-sided tape between them. Then cut both wings in one operation.

3 Cut the radius in the axle supports and drill the axle holes. Lay out and cut the radius shown in the *Side View* on the band saw or jigsaw. Mark and drill the axle holes.

4 Round the appropriate edges of the fuselage, wings, tail wing, tail fin, tail support, and axle supports. Put a ¼-inch roundover bit in your router. Secure the router in a router table and round all the edges that will be exposed when the plane is assembled. Do not round the sections of the parts that meet other parts. For example, don't round the bottom wing where it meets the fuselage.

Use a push stick when routing and keep your hands well away from the cutter. A pair of scratch awls makes excellent push sticks for small parts.

5 Rout the engine groove in the fuselage. Put a ⅜-inch-diameter round nose bit in your router. Secure the router in a router table and rout the engine groove shown. Guide the fuselage with a miter gauge set at 90 degrees and run the front of the fuselage against a fence to ensure a straight cut.

6 Drill the dowel holes in the parts. Set up a drill press to drill the dowel holes for attaching the wings, tail, tail fin, tail support, axle support, and pilot. Make sure that you drill the dowel holes and mortises to the depths shown. Only the tail wing's dowel holes are drilled completely through the piece.

Locate the exact position of matching dowel holes with commercially available dowel centers. For example, drill dowel holes in one of the axle supports, as shown in *Side View.* Put the dowel centers in the holes and position the axle supports on the bottom of the lower wing. Press the points of the dowel centers into the wing to mark the exact position of the matching dowel holes.

SHOP TIP: Substitute drywall screws for dowels for a simpler construction. Drill the holes with a combination pilot hole bit, available at most hardware stores. The bit will also drill a counterbore, which you can fill with a wooden plug. Glue the plug in place and sand it flush—it will be nearly invisible.

7 Drill the axle holes in the wheels. Most wooden wheels that you can buy will have no larger than a ⅜-inch-diameter axle hole. Drill out the holes in the wheels to a ½-inch diameter.

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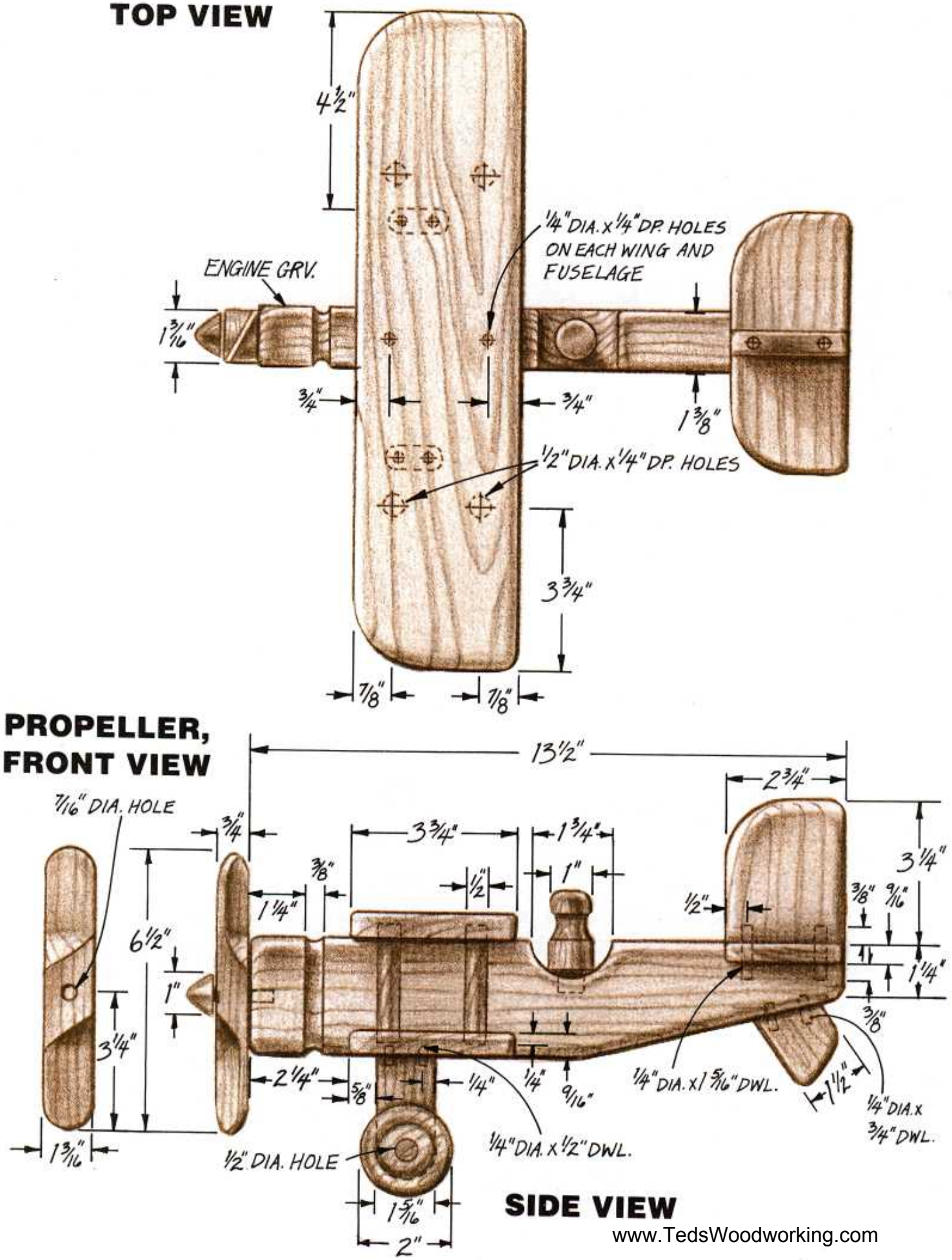

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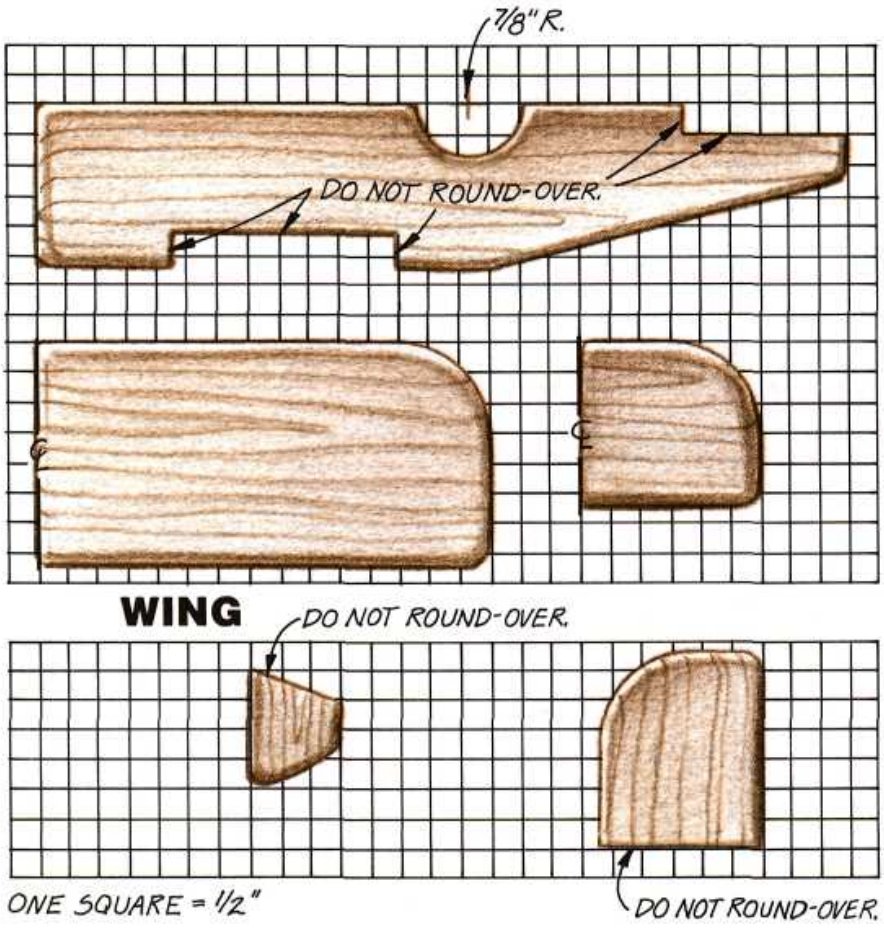
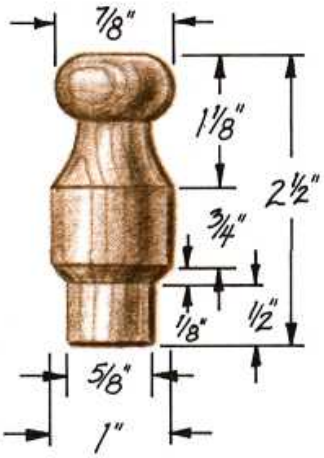
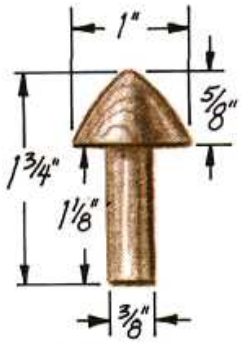
CUTTING PATTERN



PILOT LAYOUT



PROP SHAFT LAYOUT



TAIL SUPPORT

8 Turn the prop shaft and pilot. Set up the stock on a lathe, put on your safety glasses, and turn the parts to the shapes shown in the *Prop Shaft Layout* and *Pilot Layout*. When each part has been turned, sand it while it is still on the lathe. Turn off the lathe, saw off the waste with a backsaw, and sand the ends smooth and even.

If you're not an experienced turner, *Creative Woodturning* by Dale L. Nish is a good beginner's guide.

If you don't have access to a lathe, you can order similar parts from the source given in the Cutting List and adjust the size of the necessary holes accordingly.

9 Drill and shape the propeller. Mark and drill the prop shaft hole in the propeller shown in the *Propeller, Front View.*

Lay out and cut the radius on each end of the propeller with a band saw or jigsaw. Shape the blade angle on a stationary belt sander, as shown in the *Propeller Shaping Technique*. Put on some leather gloves to protect your hands. Then hold the propeller at a slight angle, as shown, and slowly sand away stock to form the blades.

Always wear safety glasses when working on the belt sander. The moving belt can grab a piece and throw it at you with surprising force.

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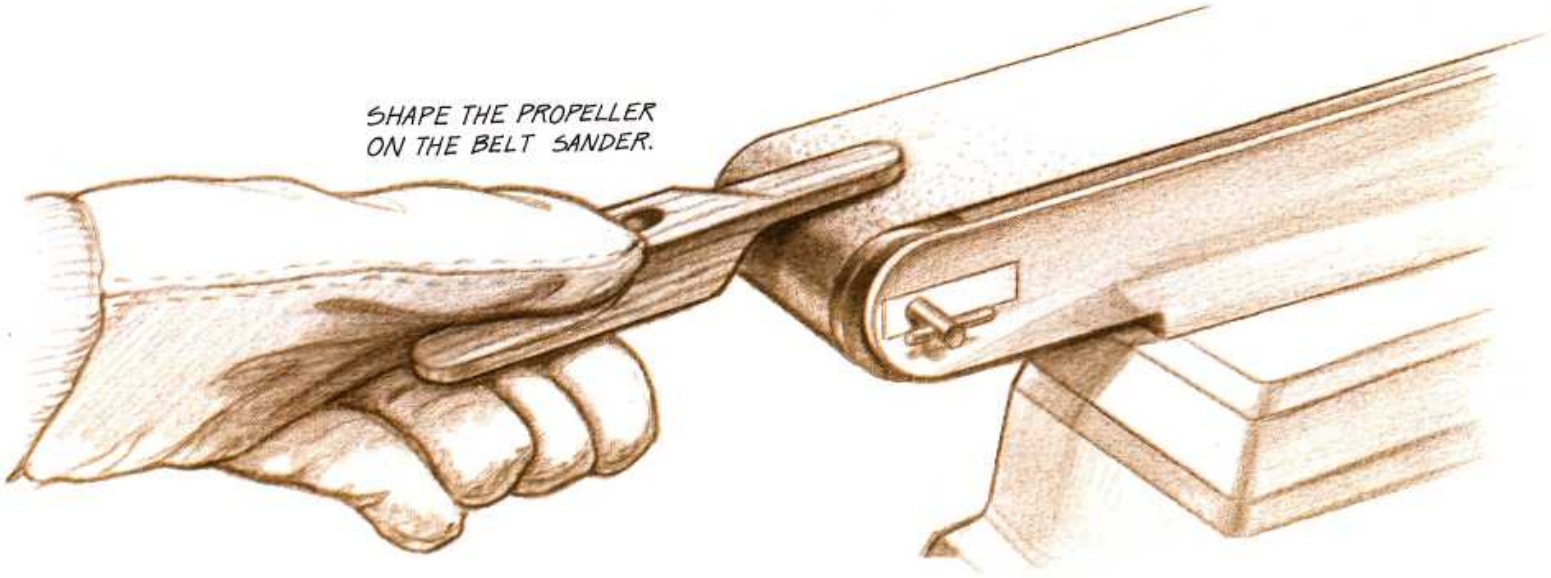

PROPELLER SHAPING TECHNIQUE

10 **Assemble the biplane.** Cut the different lengths of dowel required for the dowel joints. Test fit the biplane to make sure that it goes together well and make any necessary adjustments.

Assemble the wing to the fuselage first. Glue the dowels between the lower wing and the fuselage. Glue the wing struts in place, and then glue and dowel the upper wing above the wing struts and fuselage.

Next, glue the 1 5/16-inch-long dowels through the tail wing leaving equal amounts of the dowels exposed on each surface. Glue the tail fin above the tail wing and glue the entire assembly to the fuselage.

Glue and dowel the tail support below the tail and the axle supports below the wing.

Hold the parts together with small clamps and rubber bands. Wipe away any excess glue with a damp cloth.

When the glue is dry, glue the wheels and axle in place. Then put the prop shaft through the propeller and glue it in place. Don't apply too much glue or it will squeeze out and the propeller will seize up, causing the biplane to crash in flames.

The last thing you need to add is the pilot—somebody has to drive. The pilot can either be glued in place or left removable.

11 **Finish the biplane.** Finish sand the biplane. Wipe off the sanding dust and paint, stain, or apply a clear varnish. Allow the finish to dry, and then take off on an adventure.

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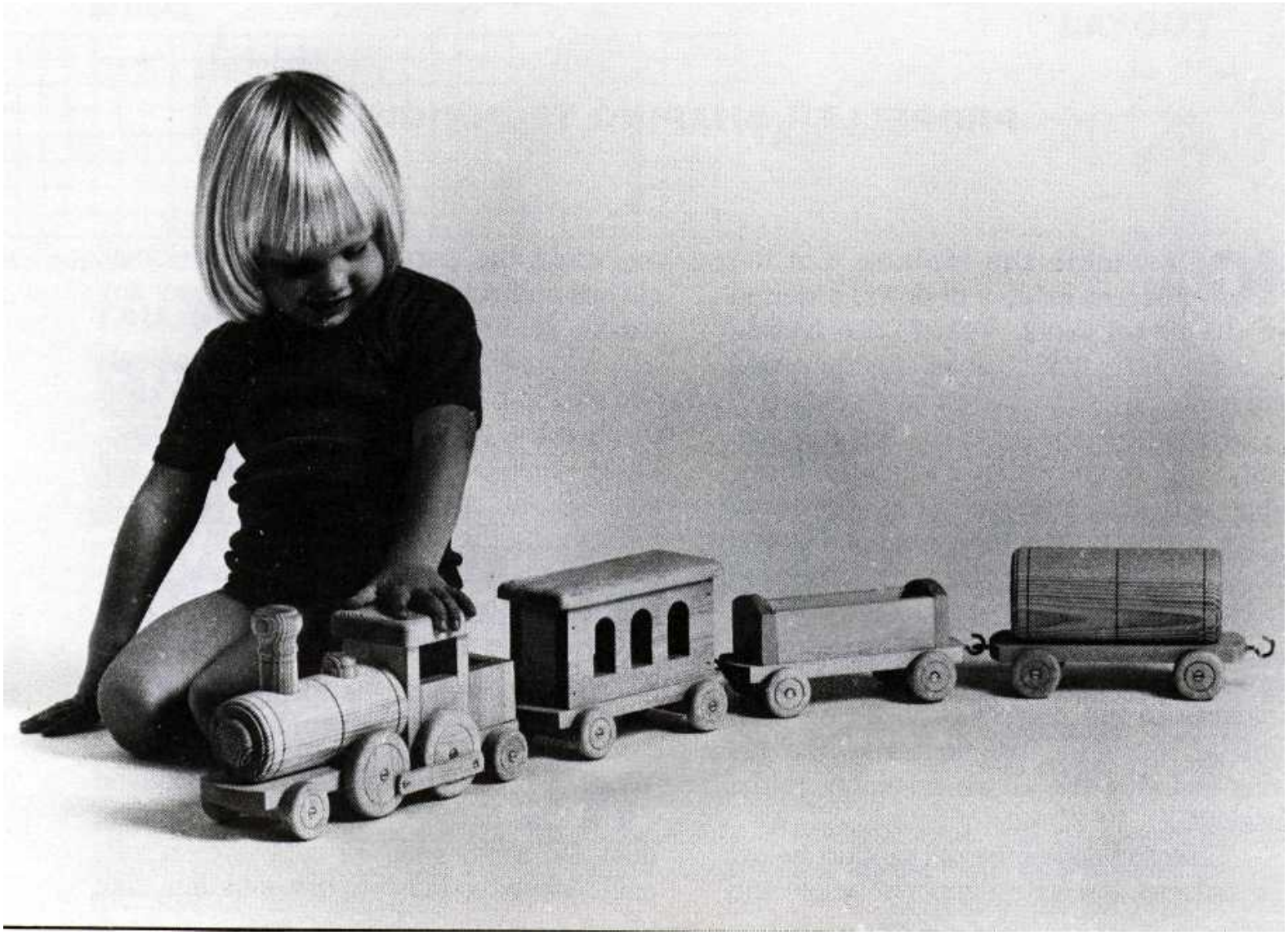
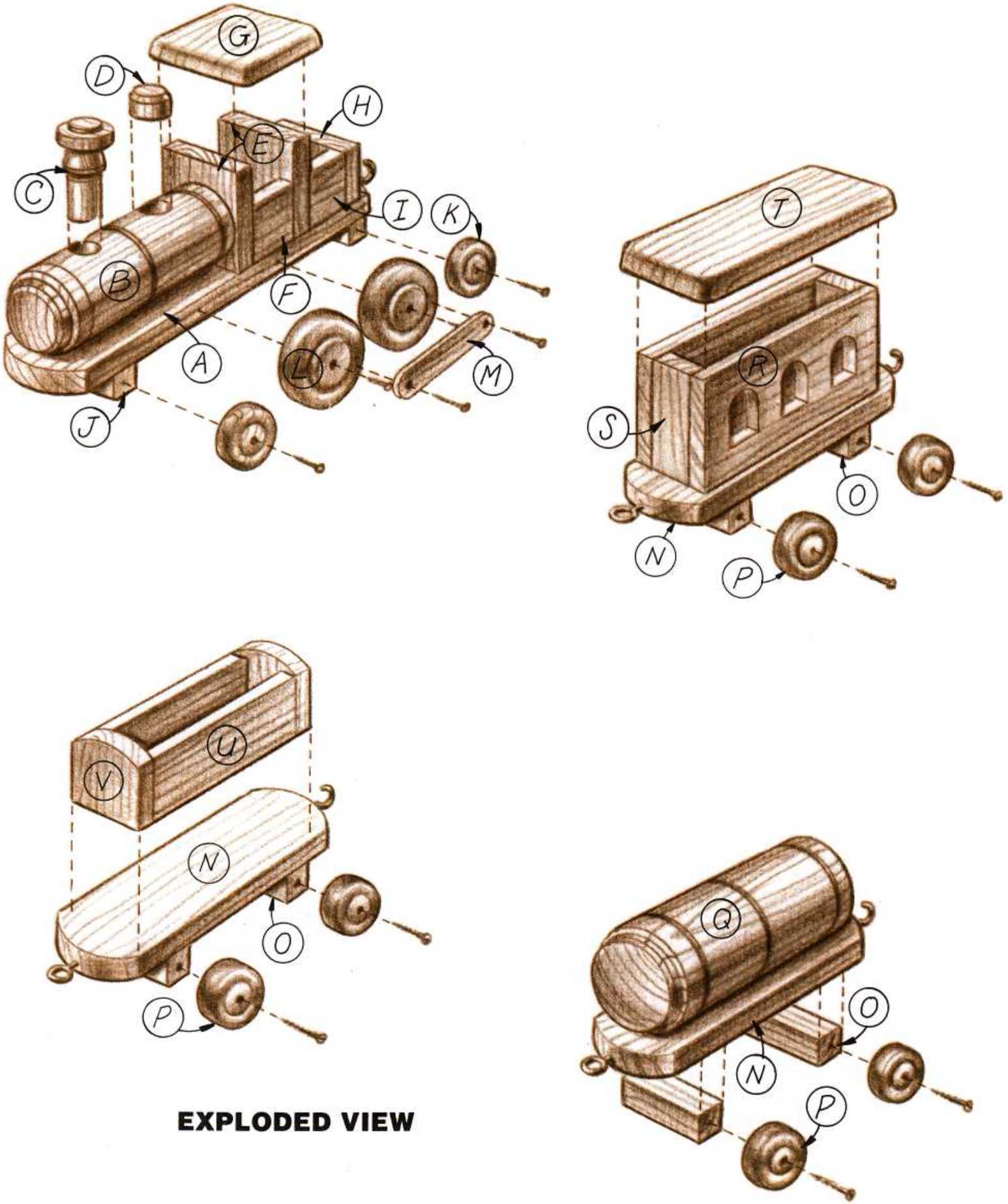
STEAM TRAIN





EXPLODED VIEW

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CUTTING LIST

Part	Quantity	Dimension	Comment
Engine			
A. Chassis	1	5/8" × 2¾" × 12¾"	
B. Boiler	1	2⅝" dia. × 8"	Cut to length after turning.
C. Smoke stack	1	1½" dia. × 3¾"	Cut to length after turning.
D. Steam dome	1	1¼" dia. × 2"	Cut to length after turning.
E. Cabin front/back	2	5/8" × 2¾" × 3⅜"	
F. Cabin sides	2	5/8" × 1¾" × 2"	
G. Cabin roof	1	¾" × 3¼" × 3½"	
H. Coal bin back	1	5/8" × 2¾" × 2"	
I. Coal bin sides	2	5/8" × 1¾" × 2"	
J. Axle beams	2	¾" × ¾" × 2⅞"	
K. Small wheels*	4	½" × 1½" dia.	
L. Large wheels*	4	½" × 2⅞" dia.	
M. Drive rod	2	⅛" × ½" × 3⅞"	
Car Chassis			
N. Chassis	3	5/8" × 2¾" × 8½"	
O. Axle beams	6	¾" × ¾" × 2⅞"	
P. Wheels*	12	½" × 1½" dia.	
Tank Car Body			
Q. Tank	1	3⅜" × 8"	Cut to length after turning.
Passenger Car Body			
R. Sides	2	5/8" × 3⅜" × 7"	
S. Ends	2	5/8" × 3⅜" × 1½"	
T. Roof	1	¾" × 3¼" × 7½"	
Gondola Car Body			
U. Sides	2	5/8" × 2" × 5¾"	
V. Ends	2	5/8" × 2¾" × 2¼"	

*Wheels are available from Woodcraft, 210 Wood County Industrial Park, P.O. Box 1686, Parkersburg, WV 26102. Part #50N21, 1½-in.-dia. wheels and part #50N51, 2⅞-in.-dia. wheels.

Hardware

16 #12 × 1¼-in. flathead wood screws
6 #8 × 1¼-in. flathead wood screws
4 #5 × ½-in. roundhead wood screws
As needed, 1¼-in. brads
4 sets ¾-in.-dia. hook screws and eyescrews

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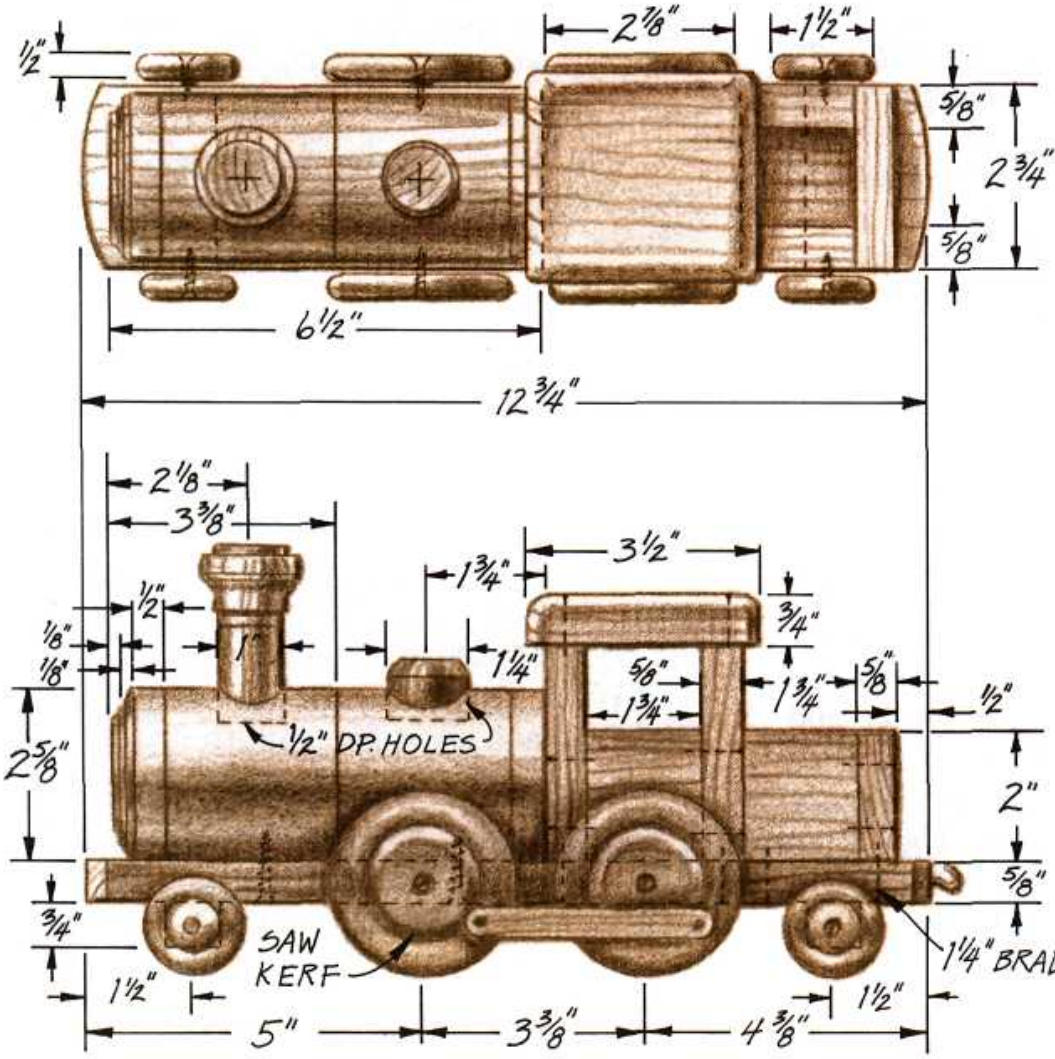
1 Select the stock and cut the parts. The steam train shown is made from pine, but almost any kind of wood will work fine. Choose straight, flat stock. You may find it necessary to glue together two or more pieces for the engine boiler and tank car's tank. Joint, plane, rip, and cut all the parts, except for the wheels, to the sizes given in the Cutting List.

2 Turn the boiler, smokestack, and steam dome for the engine and the tank for the tank car. Set up and turn the parts one by one on the lathe to the shapes shown in the *Smokestack Detail, Steam Dome Detail,* and *Tank Car with Chassis, Side View.* Sand the parts while they are still on the lathe. When the parts are thoroughly sanded, remove them from the lathe. Cut them to length and sand the ends smooth.

If you haven't done much turning, a good reference guide is *Creative Woodturning* by Dale L. Nish.

Next, make slight flat spots along the length of the boiler and tank by rubbing them back and forth over a piece of sandpaper. These flat areas allow you to attach the boiler and tank to their chassis. Sand away about ⅛ inch of wood on each.

3 Drill smokestack and steam dome holes in the boiler. Lay out the hole centers on the boiler, as shown in the *Engine, Top View.* Drill the ½-inch-deep holes, as shown in the *Engine, Side View.*



ENGINE, TOP VIEW

ENGINE, SIDE VIEW

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saw. First, put a 7/8-inch-diameter hole saw in a drill press and cut a 1/16-inch-deep kerf into the wheel stock, as shown. Then, put a 1 5/8-inch-diameter hole saw in the drill press and cut completely through the stock to make the wheel. Repeat the process for each of the small wheels.

Most hole saws have 1/4-inch pilot hole bits, and this pilot hole will serve as the axle hole in the wheels. Attach the wheels to the axle beams through this hole with #12 × 1 1/4-inch flathead wood screws. Chamfer the outside edges of the axle holes with a countersink bit to accept the screw heads. Drill a pilot hole in the exact center of the ends of each axle beam and screw the wheels in place. Remember, these are wheels, and wheels must be able to turn freely; so don't screw the wheels too tightly in place.

Wheels can also be purchased from the source given in the Cutting List. The purchased wheels will work fine, but they are 3/8 inch thick as opposed to 1/2 inch thick. Also, the purchased wheels have 1/8-inch axle holes, so adjust the hole size or axle screw size accordingly.

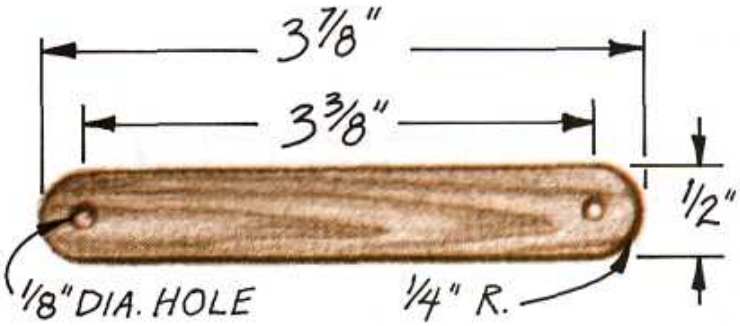
9 Attach the axle beams to the chassis. Position the axle beams under the engine and car chassis, as shown in the *Engine, Side View* and the *Chassis, Bottom View.* Attach them with glue and 1 1/4-inch brads.

10 Make or purchase the large wheels and attach them to the engine chassis. The large wheels can also be cut with hole saws. First, make the 1/16-inch-deep saw kerfs shown with a 1 3/4-inch-diameter hole saw. Then cut all the way through the stock with a 3-inch-diameter hole saw. As with the small wheels, chamfer the edges of the axle holes to accept the heads of the axle screws.

Lay out the position of the large wheels on the engine, as shown in the *Engine, Side View.* Make sure that the layout allows all the wheels to touch the ground. Make any necessary adjustments and drill the pilot holes. Screw the large wheels in place.

11 Attach the drive rods to the large wheels. The drive rod is held to the wheels with #5 × 1/2-inch roundhead wood screws. Drill pilot holes for these screws exactly 3/8 inch from the outside edge of the wheels, as shown in the *Engine, Side View.* Drill the screw clearance holes in the drive rod, as shown in the *Drive Rod Detail,* and screw the drive rod in place. Don't tighten the screws too much; the drive rod must be able to move freely.

DRIVE ROD DETAIL



12 Sand, finish, and add the hook screws and eyescrews to the steam train. Sand the train engine and cars and, as you sand, round-over any sharp corners. You can finish the train in any way you choose. The train shown simply has a clear varnish to protect the wood. You could finish your train in the same way or paint it to look like a real train.

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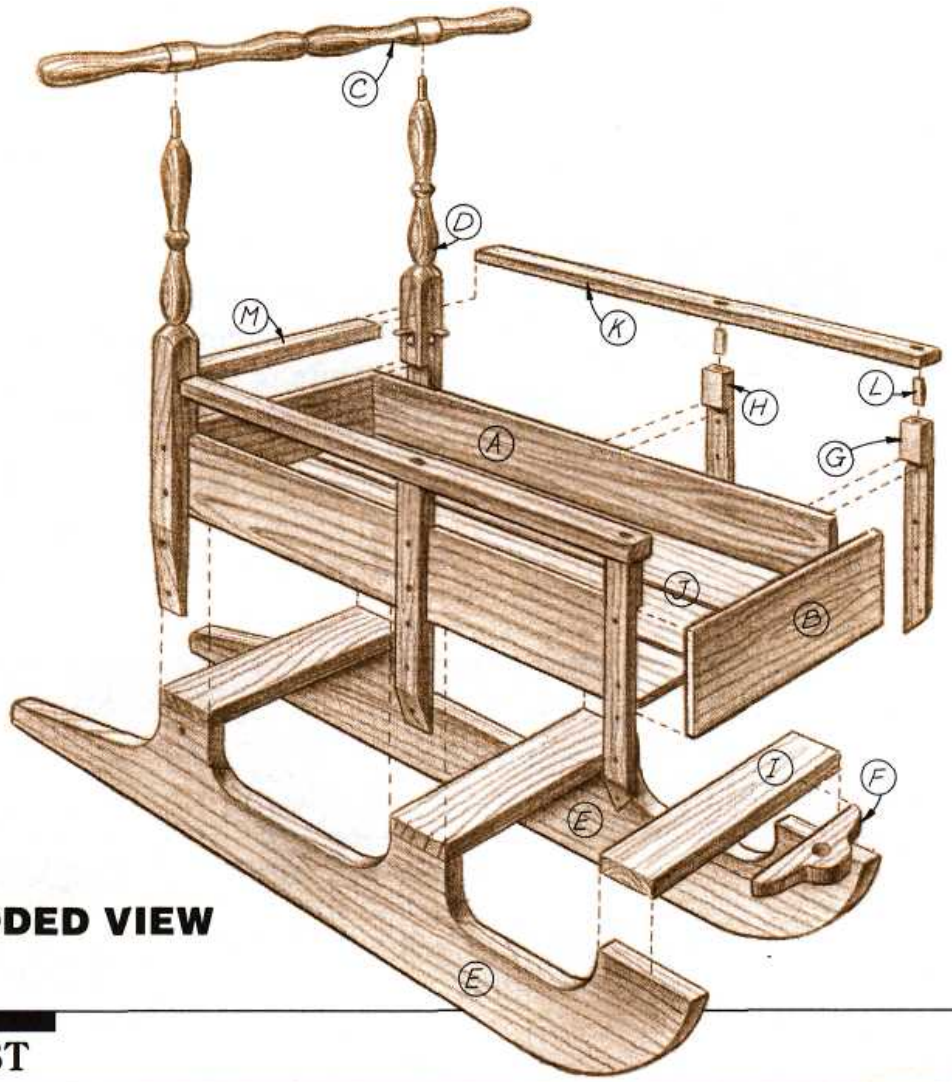
SLED



EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Sides	2	¾″ × 4¾″ × 31″	
B. Front/back	2	¾″ × 4¾″ × 15½″	
C. Handle	1	1¾″ × 1¾″ × 28¾″	Trim after turning.
D. Handle supports	2	1¾″ × 1¾″ × 31″	Trim after turning.
E. Runners	2	1″ × 6⅝″ × 48″	
F. Nose piece	1	1″ × 2½″ × 8¾″	
G. Front posts	2	¾″ × 1¾″ × 12¼″	
H. Middle posts	2	¾″ × 1¾″ × 13⁷⁄₁₆″	
I. Cross supports	3	1″ × 2¾″ × 16″	Trim to fit.
J. Floor slats	3	¾″ × 4⅜″ × 30¼″	
K. Side rails	2	1″ × 1⅜″ × 31½″	
L. Dowels	4	⅜″ dia. × 2″	
M. Back rail	1	1″ × 1⅜″ × 14½″	Cut to fit.

Hardware

As needed, #8 × 1½-in. flathead wood screws
As needed, #8 × 1¼-in. flathead wood screws
As needed, #8 × 1-in. flathead wood screws
As needed, #8 × 1¾-in. flathead wood screws
2 ¼-in.-dia. × 2½-in. carriage bolt
4 ⅝ × 2-in. metal corner braces

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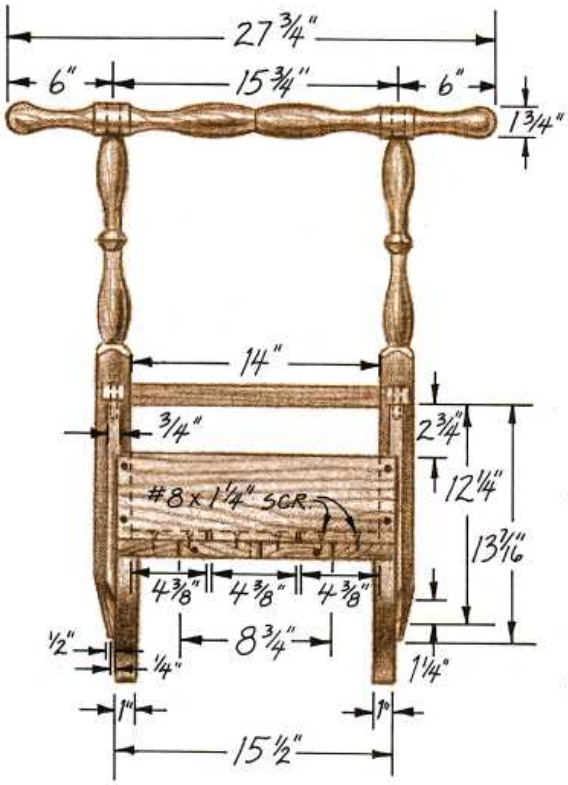
1 Select the stock and cut the parts. Oak is a good choice of wood for this project, but other hardwoods could also be used. Choose straight, flat stock without knots. Joint, plane, rip, and cut the parts to the sizes given in the Cutting List. Notice that the handle and handle supports are 1 inch longer than their finished dimensions to allow for turning.

2 Assemble the box frame. The box frame is made up of the sides, front, and back. Simply butt the sides between the front and back, and screw through the front and back into the sides, as shown in the *Front View.* Predrill for #8 × 1½-inch flathead wood screws with a commercially available combination pilot hole bit. A combination pilot hole bit drills a countersink hole, a clearance hole for the screw shank, and a slightly smaller pilot hole for the threads all in one operation. Make sure that the top edge of the sides aligns with the top edge of the front and back.

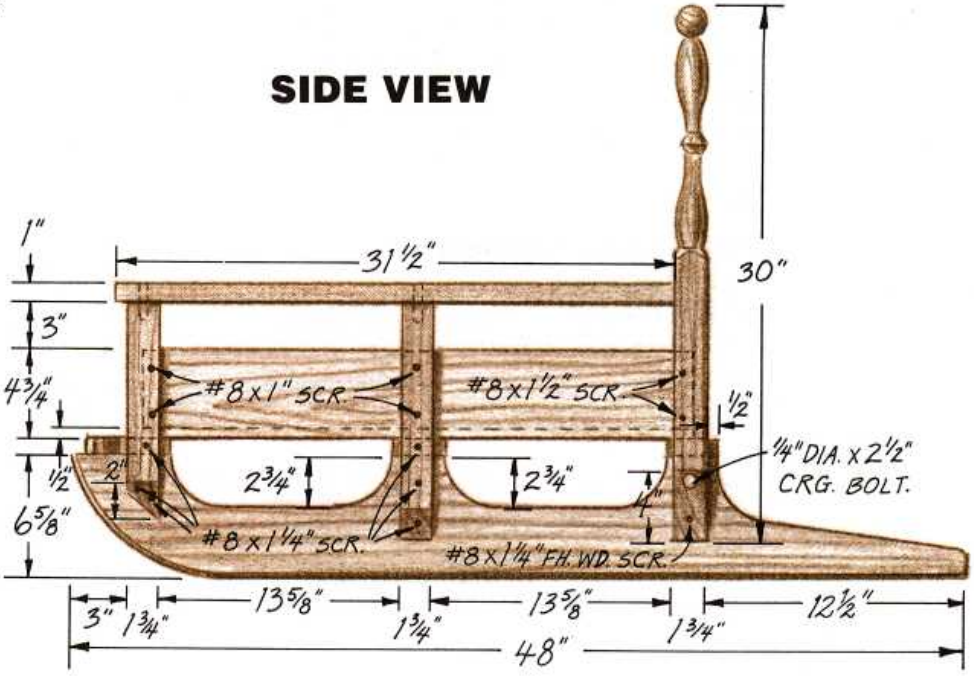
3 Drill holes in the handle and turn the handle and handle supports. Before turning, lay out and drill ¾-inch-diameter handle support holes in the handle.

Turn the handle and handle supports on the lathe to the profile shown in the *Handle Detail* and *Handle Support Detail.* Turn the ¾-inch-diameter tenons at the

FRONT VIEW



SIDE VIEW



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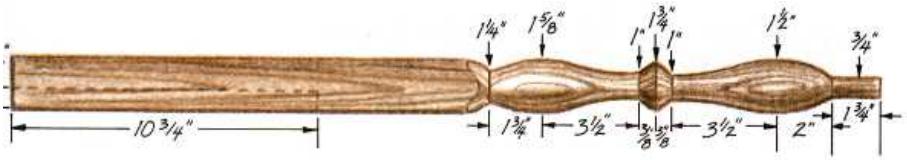
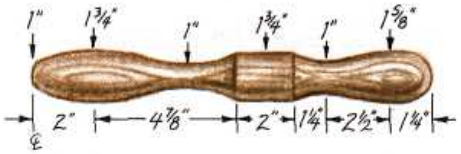
tops of the handle supports slightly longer than the thickness of the handle so they can be trimmed flush after assembly.

HANDLE SUPPORT DETAIL



HANDLE DETAIL



4 Cut the runners and nose piece to shape. Draw a ½-inch grid on a piece of paper and draw the runner and nose piece patterns onto it, as shown in the *Runner Detail* and *Nose Detail.* Transfer the patterns to the wood and cut the parts to shape with a band saw or jigsaw. Sand the sawed edges smooth.

After you cut the nose piece to shape, lay out and drill the ¾-inch-diameter rope hole, as shown in the *Nose Detail.*

SHOP TIP: After you have cut one runner to shape, use it as a template to lay out the second runner.

5 Fit the front posts, middle posts, and handle supports to the box frame. The front posts, middle posts, and handle supports are all notched to fit around the box frame. Lay out the ¼-inch-deep notches on the front and middle posts starting 2¾ inches from the top, as shown in the *Front View.* Lay out the ¾-inch-deep notch on the handle supports, as shown in the *Handle Support Detail.*

Notch the parts on a band saw. To ensure a straight cut, set up a fence on the band saw table to guide the long cuts.

While you are still at the band saw, cut the 45-degree angles on the bottom ends of the front posts, as shown in the *Side View.*

Taper the bottom ends of the posts and handle supports on a stationary belt sander to the profiles shown in the *Front View.*

6 Fit the cross supports and screw them to the runners. Cut the cross supports to the exact width of the box frame. Predrill with a pilot hole bit and attach the nose piece to the front cross support with glue and #8 × 1¾-inch screws, as shown in the *Front View.* Predrill and attach the cross supports to the tops of the runners.

7 Assemble the posts and handle support to the box frame and runners. First, set the box frame in position on top of the cross supports and runners and then clamp the front and middle posts and handle supports to it. Position the parts as shown in the *Side View.*

Next, lay out and drill pilot holes for #8 × 1-inch, #8 × 1¼ -inch, and #8 × 1½-inch flathead wood screws, as shown in the *Side View.* Also drill a ¼-inch-diameter hole through each handle support and runner for a carriage bolt, as shown.

Drive the appropriate screws into their pilot holes and attach the carriage

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bolts to the handle supports and runners.

Remove the clamps.

8 Attach the floor slats. Drop the floor slats in place, as shown in the *Front View,* spacing them evenly to allow snow to melt through. Drill pilot holes for #8 × 1¼-inch screws through the floor slats and into the cross supports and screw them in place.

9 Attach the side and back rails. The side rails are doweled to the front and middle posts and then fastened to the handle support with metal corner braces. The back rail is attached between the handle supports with metal corner braces. First, position the side rails on top of the front and middle posts and against the handle support, as shown in the *Side View* and *Front View.* Clamp the rails in place and drill ⅜-inch-diameter by 2-inch-deep dowel holes through the side rails and into the front and side posts.

Next, spread glue on the dowels and tap them down into the dowel holes.

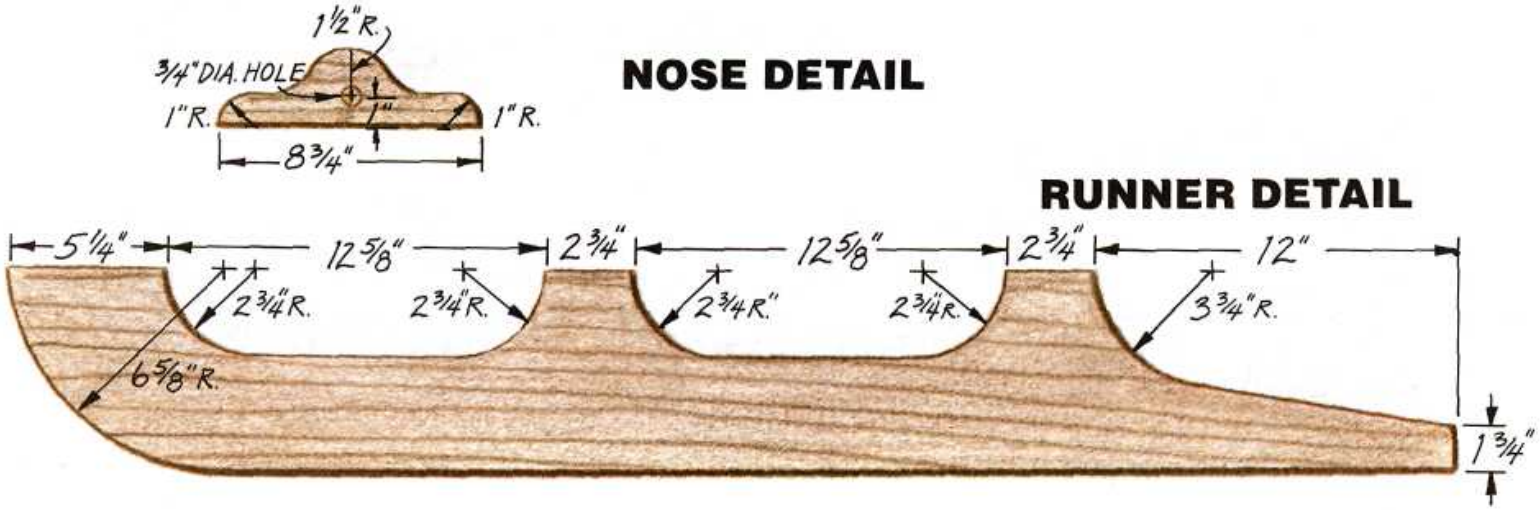
When the dowels are in place, position the metal corner brace, as shown in the *Side View.* Drill screw pilot holes through the existing holes in the brace and into the handle support and side rails. The screw hole diameter in metal corner braces may vary, so choose screws to fit your brace. Drive the screws in place.

Next, cut the back rail to fit between the handle supports and position it as shown in the *Front View.* Attach the back rail to the handle supports with screws and metal corner braces.

10 Attach the handle. The holes in the handle fit over the tenons on the handle supports. Test fit the handle to the handle supports, and if the tenons are too tight, remove some stock from them with sandpaper. When the tenons fit properly, spread glue on them and attach the handle. Allow the glue to dry.

11 Apply the finish. Finish sand the sled and apply a varnish or paint capable of handling lots of moisture.

Mush, you huskies!



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CHILD'S WAGON

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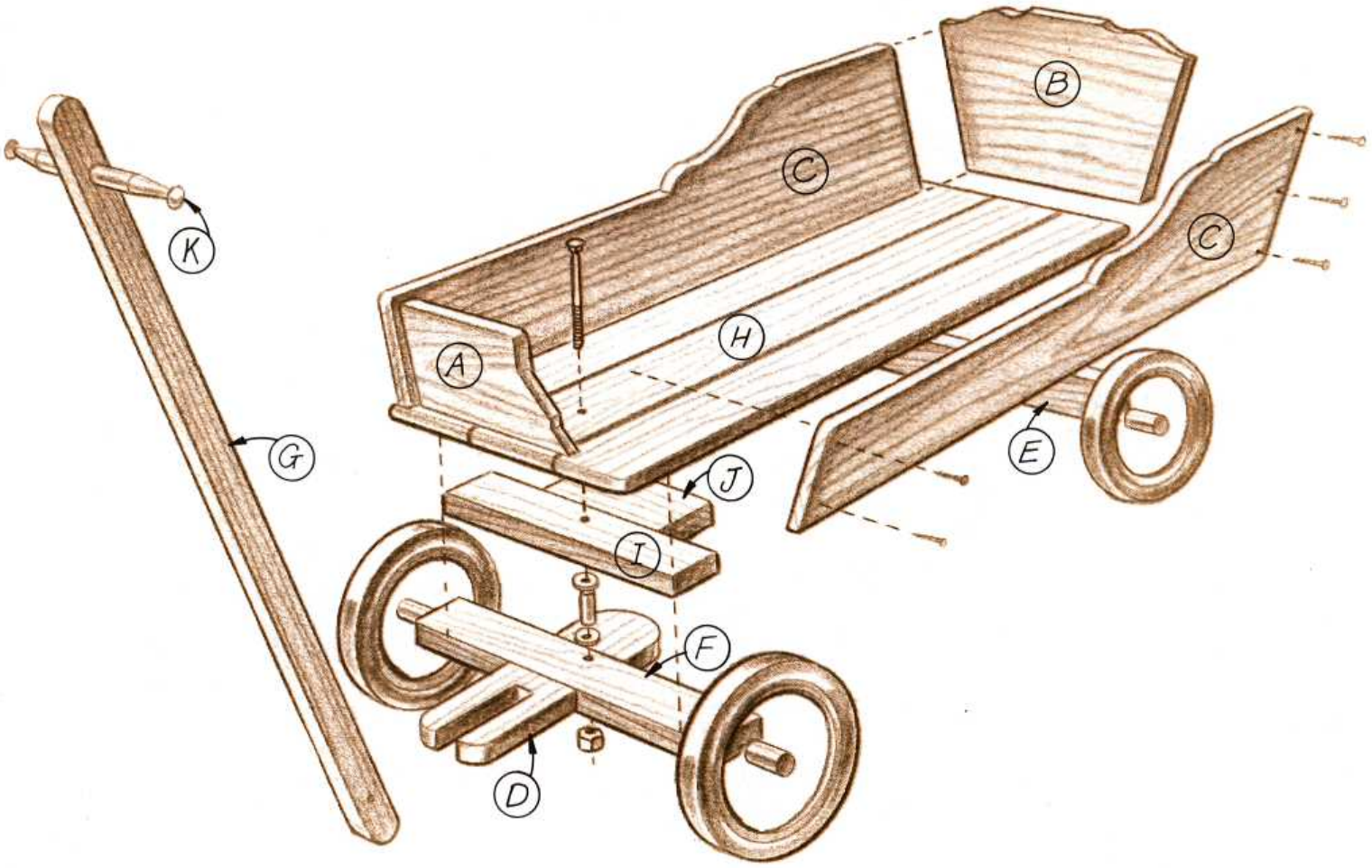

EXPLODED VIEW

CUTTING LIST

Part	Quantity	Dimension	Comment
A. Front	1	3/4" × 6 1/4" × 15 3/4"	
B. Back	1	3/4" × 10 3/4" × 18 1/2"	
C. Sides	2	3/4" × 10 1/2" × 40"	
D. Yoke	1	1 1/2" × 3 3/4" × 13"	
E. Rear axle support	1	1 1/2" × 2 3/4" × 18 1/2"	
F. Front axle support	1	1 1/2" × 2 3/4" × 19 1/2"	
G. Handle	1	1 1/2" × 1 3/4" × 42"	
H. Bottom boards	3	3/4" × 5" × 41"	
I. Cleat	1	1 1/2" × 2 3/4" × 14 1/2"	
J. Brace	1	1 1/2" × 3 3/4" × 7 1/2"	
K. Handholds*	2	7/8" dia. × 3 3/8"	Shaker pegs

*Available from The Woodworker's Store, 21801 Industrial Boulevard, Rogers, MN 55374. Specify part #B1501 for birch, #B1502 for oak, or #B1503 for walnut.

Hardware

As needed, #8 × 1 1/2-in. flathead wood screws
As needed, #8 × 1 1/4-in. flathead wood screws
As needed, #8 × 1-in. flathead wood screws
1 3/8 × 5-in. carriage bolt with two washers and a stop nut
1 1/4 × 4-in. carriage bolt with a washer and stop nut
4 1/2-in. dia. push nut caps
4 1/2-in.-dia. washers
1 1/2-in.-O.D. × 1-in. bushing (3/8-in. I.D.)
4 5/8 × 2-in. angle brackets
8 1/2 × 2-in. metal mending plates
4 10-in.-dia. ball-bearing wheels with 1/2-in.-dia. axle holes. Available from Youngs, P.O. Box 1, Route 309, Line Lexington, PA 18932. Part #A-WH-9082-SP.
2 1/2-in.-dia. × 36-in. steel rods

1 Select the stock and cut the parts. You can get the wood you need for this wagon preplaned from the lumberyard. Cut the thicker pieces from 2 × 4s and 2 × 6s. Cut the thinner stock from 1 × 6s and 1 × 8s. Glue up stock to make the sides and back.

Cut the angles in the front and back as you cut them to the sizes given in the Cutting List. Lay out the angles directly on the stock and cut the angles on the table saw with a miter gauge set at 75 degrees. Rip 15-degree bevels on the bottom edge of the sides, as you cut the parts to width.

Get your hardware before you begin construction, in case you need to make alterations. Sturdy ball-bearing solid wheels replace the wire-spoked wheels of the original wagon; if you prefer to use spoked wheels, you may be able to salvage them from a baby carriage. The axles are made of 1/2-inch-diameter steel rod. The bronze bushings in the yoke can be found in hardware stores or at electrical supply stores.

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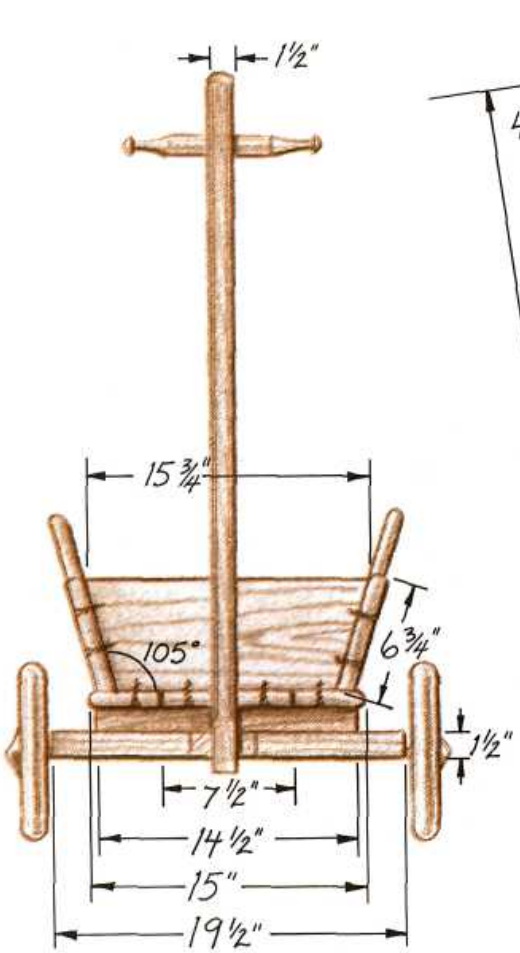
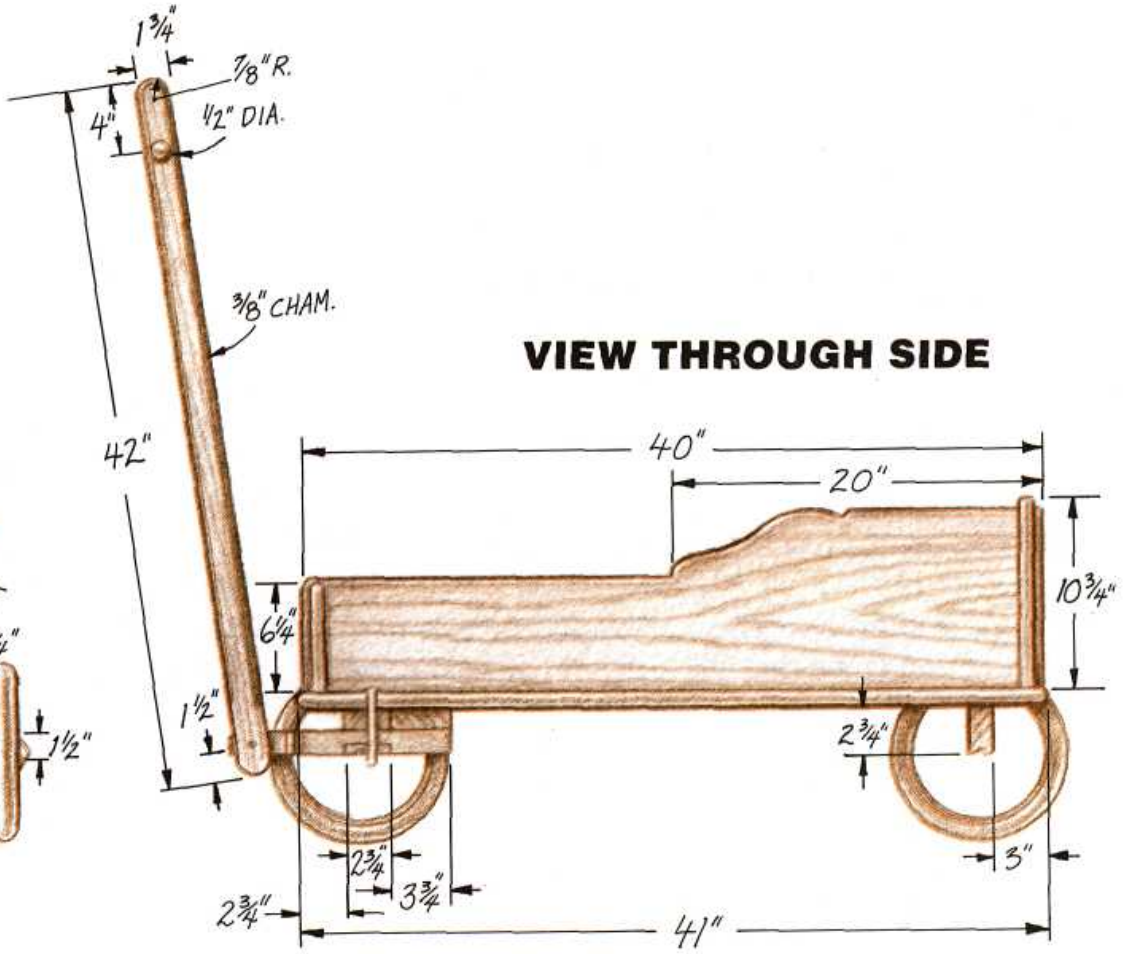
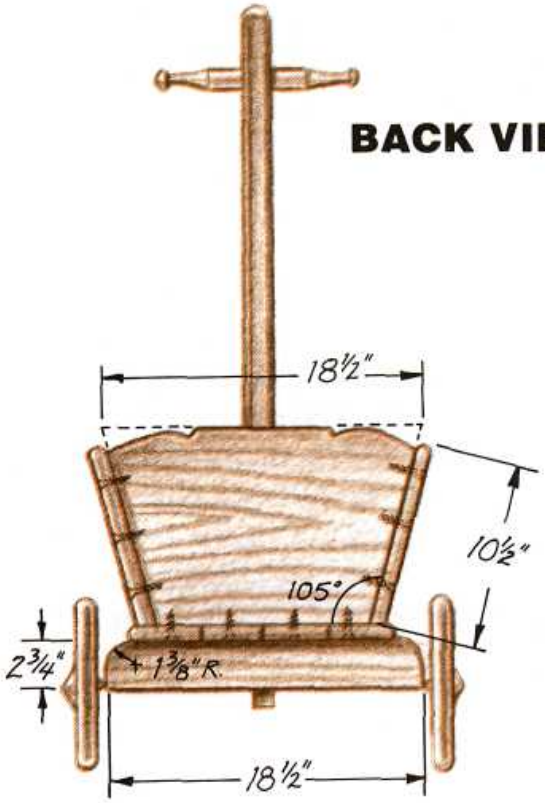


FRONT VIEW



VIEW THROUGH SIDE



BACK VIEW

2 Cut the parts to shape. With a compass, lay out the radii on the yoke and rear axle support and the handle. Then draw a ½-inch grid on a piece of paper and draw the side and back shapes onto it, as shown in the *Side Detail* and *Back Detail.* Transfer the patterns to the stock and cut the parts to shape on the band saw. Sand any saw marks smooth.

3 Rout for the axles. In the next few steps, you'll make the wagon's chassis. After that, you'll make the box that sits on top of the chassis.

First, lay out and rout ½ × ½-inch axle grooves in the front and rear axle supports. Put a ½-inch straight bit in your

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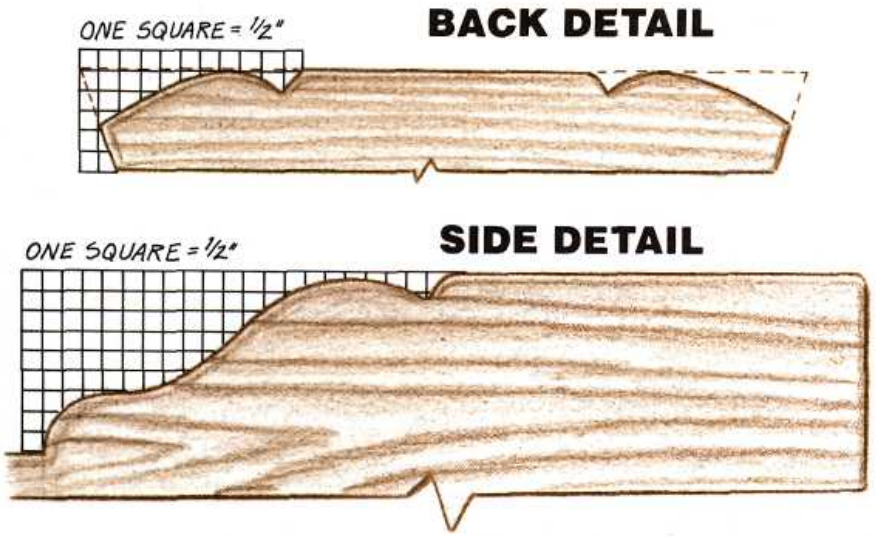

router. Secure the router in a router table and guide the axle supports against a fence as you rout. Center the groove in each axle support, as shown in the *View through Side* and the *Support Bottom View.*

4 Assemble the bottom. First, place the cleat and the rear axle support on a flat work surface, parallel to one another and 31½ inches apart. Put a shim under the yoke, so that the top of the yoke and the rear axle support are at the same level. Mark the location of the cleat and support in pencil on the bench, so that you'll know if you've nudged them out of place.

Put the bottom boards on top of the cleat and rear axle support, positioning them as shown in the *Front View* and *View through Side.* Make sure that the bottom boards are perpendicular to the cleat and support and then check that the cleat and support haven't strayed from the pencil marks.

Drill screw holes for two #8 × 1½-inch flathead wood screws through both ends of each board and into the cleat and support. A #8 pilot hole bit will drill the appropriate-size holes in each piece and countersink for the screw head in one pass.

Next, put the brace in position behind the front cleat, as shown. Drill holes with the pilot bit through the bottom boards and into the brace. Attach the cleat with #8 × 1½-inch flathead wood screws.

5 Cut the handle notch in the yoke. The yoke houses both the handle and the front axle. Lay out the notch for the handle on the yoke stock to the dimensions shown in the *Support Bottom View.* Cut out the notch on the band saw, then file and sand away any saw marks or irregularities. Lay out and drill a ¼-inch-diameter hole through the tongues of the yoke for the bolt that secures the handle.

6 Cut the lap joint. The front axle support and the yoke are joined by a lap joint. Lay out the ¾-inch-deep lap joints on the axle support and yoke, as shown in the *Support Bottom View.* Cut the joints on the table saw with a dado cutter. To cut the lap, screw a piece of straight scrap to your miter gauge as an extension, set the gauge to 90 degrees, and guide your stock over the dado cutter.

When the laps have been cut, put the yoke and axle support together and make sure that the corners form 90-degree angles. Attach the two parts with glue and four metal angle brackets, as shown.

7 Attach the yoke. Lay out and drill the ½-inch-diameter hole for the steering bushing in the yoke, as shown in the *Support Bottom View.* Tap the bushing in place.

With the wagon body still upside down, position the yoke assembly on the cleat. Put a pencil through the bushing to

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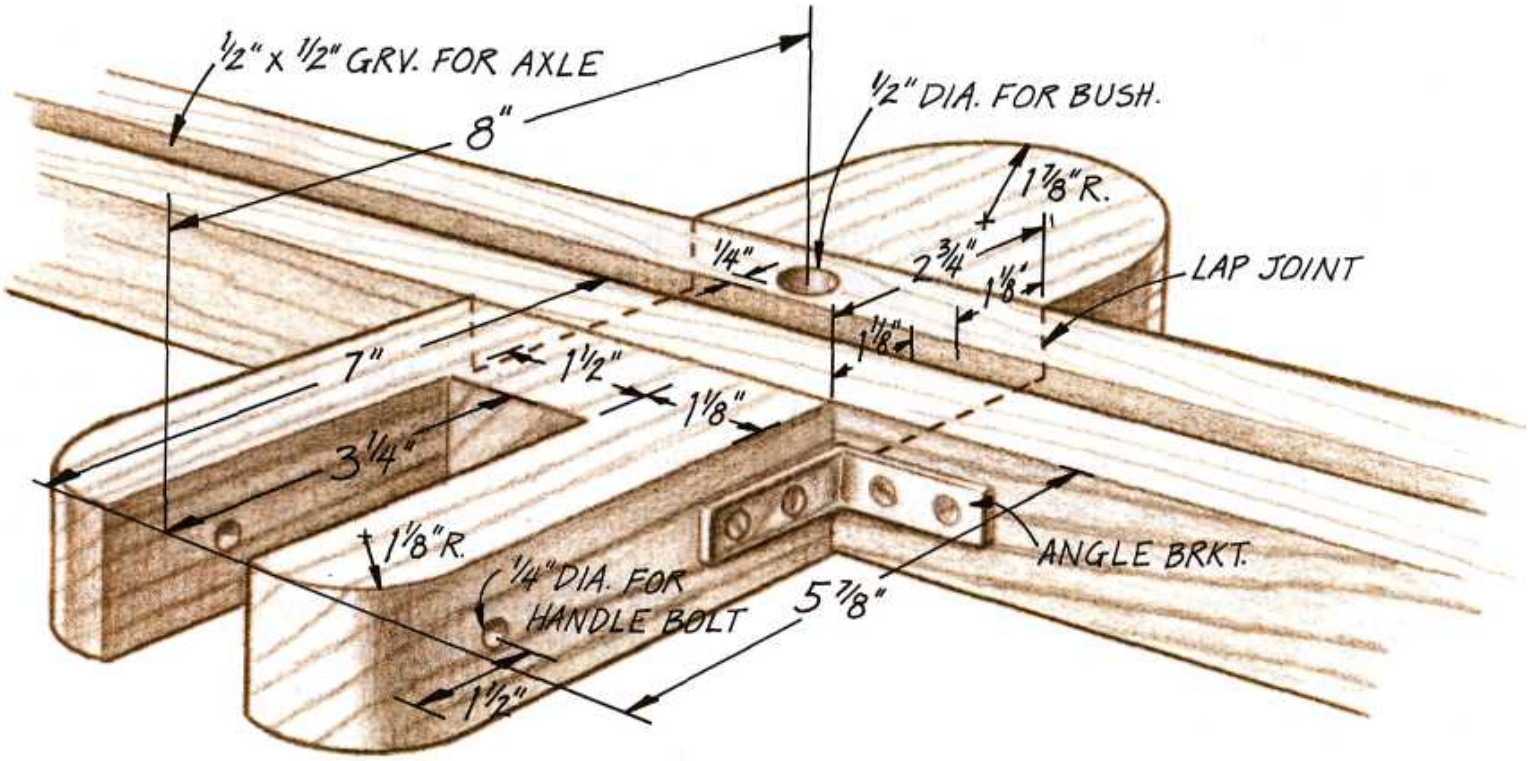
SUPPORT BOTTOM VIEW



mark the position of the steering bolt hole on the cleat and drill a ⅜-inch bolt hole all the way through the cleat and bottom board.

Bolt the yoke in place. As you do, put a nut washer between the yoke and axle and between the stop nut and yoke. Be sure to use a stop nut. Stop nuts have a nylon collar just above the threads that keeps the nut from slipping off. Don't put the nut on too tightly because the yoke should move freely.

8 Assemble the front, sides, and back. Assemble the front, sides, and back independently of the rest of the wagon, then attach them as a unit.

To assemble the front, sides, and back, lay out and drill screw holes in the parts, as shown in the *Front View* and *Back View.* The distance between the screws isn't critical, but each row of screws should be ⅜ inch from the edge of the stock.

To drill the holes, have a helper hold the two parts together. Drill through the side and into the adjoining piece using a pilot hole bit. The bit will drill the appropriate size hole in each piece and countersink for the screw head. Drill all the necessary holes, then screw the parts together.

Center the assembled front, sides, and back on the chassis. With a pencil, mark the position of the sides along the bottom. Remove the box assembly and, on 3-inch centers, drill a series of 1/16-inch-diameter holes between the pencil lines. Clamp the box to the chassis and flip the assembly over. Enlarge each hole with a #8 pilot hole bit. Drill through the chassis and into the box. Screw the chassis to the

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box with #8 × 1½-inch flathead wood screws.

9 Attach the axles and wheels. The ½-inch-diameter steel rod stock used for the axles is typically sold in 3-foot pieces. Cut the axles to length with a hacksaw and allow enough margin on either side of the axle supports for a flat washer, the hub of the particular wheel you've chosen, and a push nut cap. Secure the wheels by hammering the push nut in place.

With the wagon upside down, place the front axle in the groove. Screw four metal mending repair plates across the axle and into the wood with #8 × 1-inch flathead screws.

Place the rear axle in the groove in its support and secure it with four metal mending plates. Put the wheels on the axles and secure them with caps or cotter pins.

10 Chamfer the edges of the handle. Put a chamfering bit in your router. Secure the router in a router table and rout a ⅜-inch stopped chamfer in all four edges of the handle. Stop the chamfer 4 inches from the bottom of the handle on all four edges.

Lay out and drill the bolt hole in the handle, 1½ inches from the handle's bottom end.

Drill a ½-inch-diameter hole centered 4 inches from the top end of the handle for the two handholds.

11 Attach the handle. Glue the handholds in place. Fasten the handle to the yoke with a ¼-inch-diameter bolt, secured by a washer and stop nut.

12 Finish the wagon. Sand the wagon, taking care to round-over any sharp edges for the safety of young passengers. Finish with two coats of either exterior polyurethane or exterior paint.

Finally, make a note on your calendar to check all of the wagon's bolts and screws for tightness after a couple of weeks of use.

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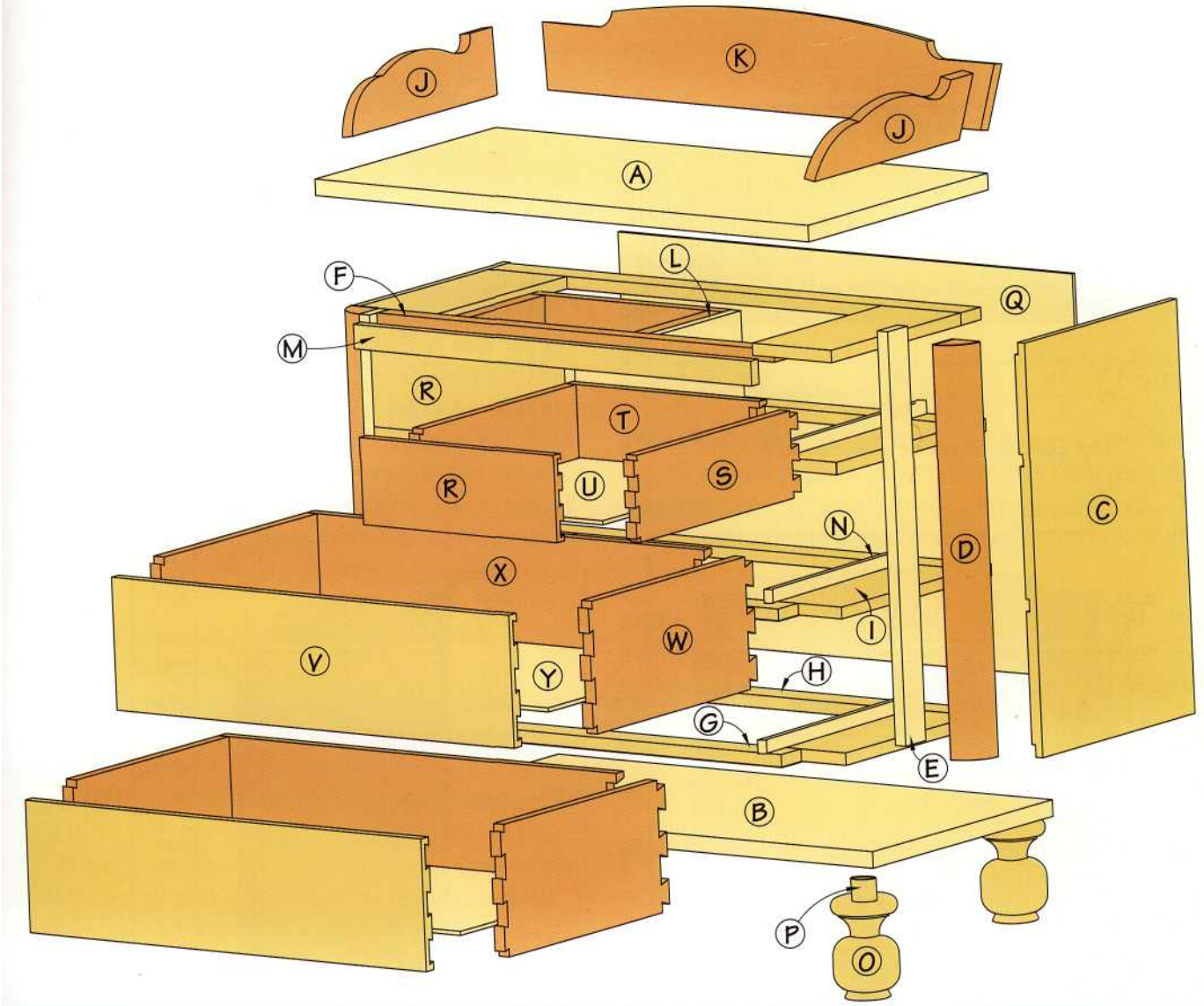
Colonial Washstand Circa 1760

I found the original of this piece while on vacation on Jekyll Island in Georgia. It was one of a pair in a conference room at the Jekyll Island Club Hotel, part of the island's historic district, and was probably made during the middle of the eighteenth century. It was, as ours is, made from pine. The patina was a lovely buttery color. Close inspection failed to reveal traces of any finish other than many years of wax polishing. Most



MATERIALS LIST

Colonial Washstand

No.	*Letter*	*Item*	*Dimensions T W L*
1	A	Top	¾″ × 18″ × 36″
1	B	Base	¾″ × 18″ × 36″
2	C	Sides	¾″ × 15¼″ × 25″
2	D	Pilasters	2″ × 2″ × 25″
2	E	Pilaster Fillers	¾″ × 2″ × 25″
1	F	Web Frames	¾″ × 1¼″ × 29″
3	G	Web Frames	¾″ × 2″ × 29″
4	H	Web Frames	¾″ × 2″ × 34½″
9	I	Web Frames	¾″ × 5¾″ × 13″
2	J	Gallery	¾″ × 5″ × 16″
1	K	Gallery	¾″ × 6″ × 33″
1	L	Drawer Partition	¾″ × 6″ × 15½″
1	M	Facing	¾″ × 1½″ × 5¼″

No.	*Letter*	*Item*	*Dimensions T W L*
1	N	Trim	¾″ × 1½″ × 29″
6	O	Drawer Guides	¾″ × 1¾″ × 15″
4	P	Feet	4″ × 4″ × 6″
4	Q	Feet	¾″ × 1¼″ dowels
1	R	Back	¼″ × 24½″ × 33⅛″
2	S	Drawer Front	¾″ × 5¼″ × 14¼″
4	T	Drawer Sides	¾″ × 5¼″ × 16½″
2	U	Drawer Backs	¾″ × 4¾″ × 14¼″
2	V	Drawer Bottoms	¼″ × 16″ × 13¼″
2	W	Drawer Front	¾″ × 8″ × 29″
4	X	Drawer Sides	¾″ × 8″ × 16½″
2	Y	Drawer Backs	¾″ × 7½″ × 29″
2	Z	Drawer Bottoms	¼″ × 16″ × 27″

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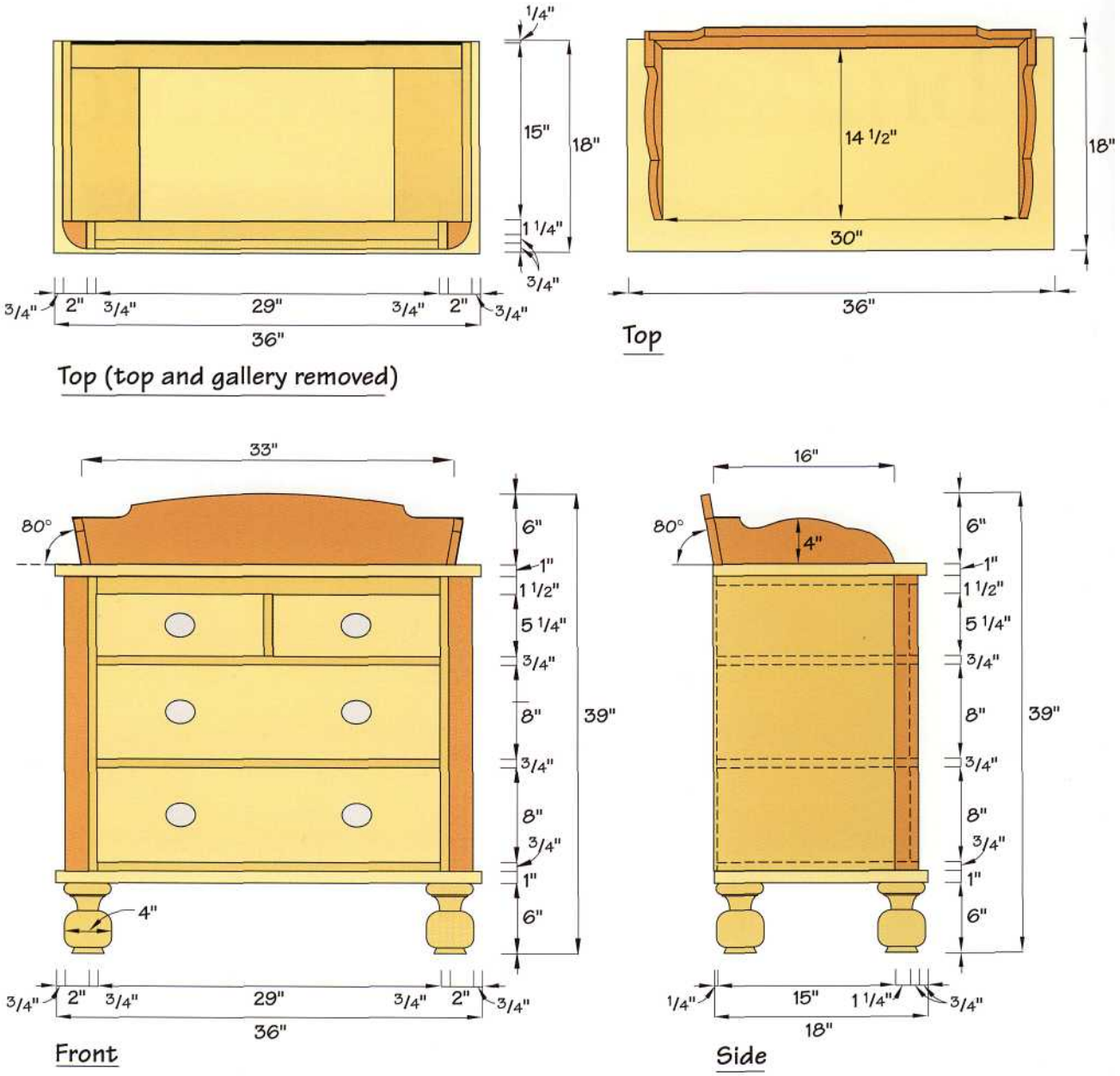


pieces like this, however, would have been painted. I've chosen a scrubbed finish, a look I've seen often on such pieces.

Before the advent of hot and cold running water, washstands like this one would have been an essential part of most early and Victorian American bedroom suites. Towels, washcloths and other linens would have been kept in the drawers while the galleried top would have been home to a large ceramic bowl and water jug. It's a look that's often duplicated to good effect today. This washstand is a faithful copy of the one I found on Jekyll Island. I've searched the books but have not been able to find anything quite like it. In other words, it seems to be unique.

CONSTRUCTION OUTLINE

At first glance this is a simple piece, but first glances can often be misleading. To make it you will need to use almost every tool in the shop. When it's finished it will provide you with a unique piece, as well as a real sense of achievement.

Basically, this is a small chest of drawers with turned feet, a nicely shaped gallery and rounded quarter pilasters. The web frames are offset to accommodate the pilaster and attached to the sides with glue and biscuits (dowels would work just as well). The top is made from furniture-grade pine a full 1" thick. The kicker is also a solid piece of stock, nominally 1" thick, upon which the carcass sits. There were no dust panels in the original. The drawers were constructed using lap joints, but, as I felt this was a quality piece, I've taken a liberty and used dovetails. The feet are glued and doweled to the kicker.

There are a couple of tricky areas: the pilasters and the construction of the carcass.

The pilasters are made from two pieces of stock, 25" long X 2" wide X 2" thick. The trick here is how to achieve the quarter-round cross-section. I did it by taking pieces of stock 36 1/2" long X 4" wide X 2" thick and gluing them together—only the first six inches at either end—to make a piece 4" X 4″. I then placed the piece in the lathe and turned off the corners to give me what was essentially an eight-sided piece—four flats and four rounded corners. At that point I removed the stock from the lathe and cut off the first six inches at either end, thus the middle section split into two halves. From there it was simply a matter of cutting one of the two halves down the middle to give me the pilasters. The two six-inch 4" X 4" sections? These I turned on the lathe to make two of the four required feet.

The carcass itself is fairly simple to construct; just take care that the offset web frames are accurately measured, made and dadoed into the sides. **Note:** One web frame is 3/4" narrower than the other three. Attaching the pilasters and fillers to the carcass, however, needs special attention. First you'll glue and screw the spacers, edge on, to the carcass (see top photo page 80), then glue and screw the pilasters to the spacers (see bottom photo page 80). Quite simple really.

The gallery or splash-back, as it's often called, is cut from furniture-grade pine, a full 1" thick, and angled to slope away at 6°. The ends of the galleries are lap-jointed and secured together with glue and cut-steel masonry nails for authenticity. The hardware, which is also faithful to the original washstand, was bought from the Woodworker's Store.

BUILDING THE WASHSTAND

STEP 1. Cut and shape the pilasters (see Shop Tip below).

STEP 2. Cut the rest of the required pieces to size.

STEP 3. Run all the edges through the jointer.

STEP 4. Build the boards that will make the top, kicker (base) and two sides.

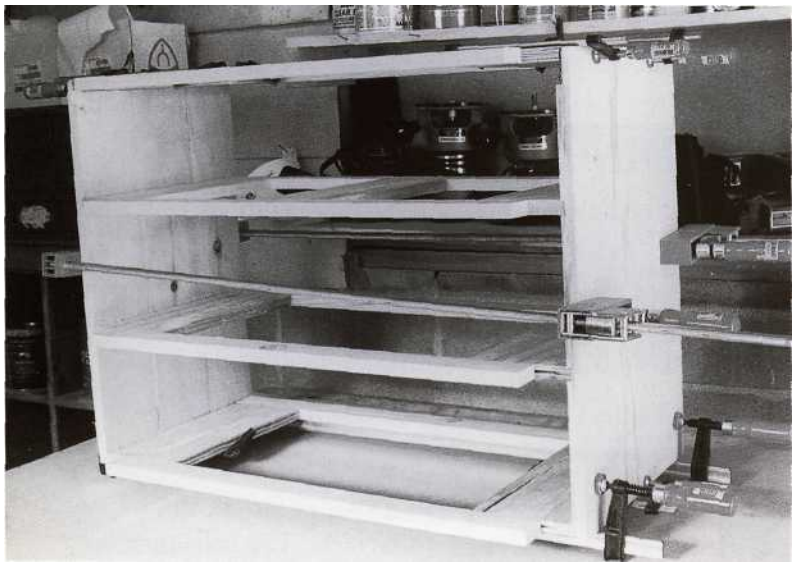
STEP 5. Build the four web frames as laid out in the drawing. Be careful to make one 3/4" narrower than the other three; this one will go at the top of the carcass. Also, be careful to make the offsets accurately as laid out in the drawing.

STEP 6. Take the two pieces of stock that will make the sides and cut rabbets 3/4" wide x 1/4" deep at the top and bottom edges to take the top and bottom web frames. Next, cut a rabbet down one long edge of each side 1/4" deep to receive the back—make sure you have a left and right side.

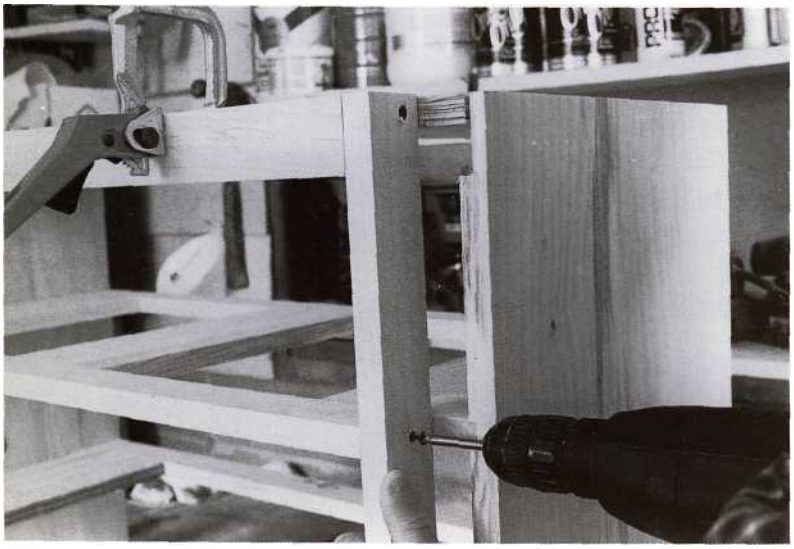
SHOP TIP

Turning Pilasters

The pilasters are an important feature of this old washstand. You might be tempted to leave them out. Don't. If you have a lathe they are quite simple and fun to make. To make your pilasters you'll need two pieces of stock 36½″ × 4″ × 2″. Apply glue to the first and last six inches of both pieces, put them together, clamp and leave overnight to cure. Find the center at each end and place the piece in the lathe. Turn the piece to round over the corners only leaving flats that measure roughly 1½″ across. While the piece is still in the lathe, sand the rounded corners smooth. Remove the piece from the lathe and cut off the first six inches at both ends; this will cause the center to fall apart into two sections, each with two ¾″ flats and a single 1½″ flat. On your table saw, split one of the pieces down the middle. This will give you two pilasters. The two 6″ sections can be turned into feet.



Glue, assemble and clamp the carcass. Note how the front center clamp is set at an angle to pull the structure square.



Glue and clamp the trim piece in place on the upper web frame, then fasten the two spacers in place on the web offsets using no. 6 screws.

STEP 7. Cut dadoes in the two side pieces as laid out in the drawing 3/4" wide x 1/4" deep to take the two center web frames.

STEP 8. Glue, assemble and clamp the four web frames to the two ends—make sure the narrower web is at the top. Square the structure, then set it aside to cure overnight.

STEP 9. Glue and screw the spacers to the webs as you see in photo above.

STEP 1O. Set the pilasters in place between the spacers and the sides and mark them and the sides for biscuit slots.

STEP 11. Cut the biscuit slots to the pilasters and side panels

STEP 12. Glue, biscuit and clamp the pilasters to the side panels and screw the spacers to the pilasters

STEP 13. Set the piece of stock to be used for the top trim in place against the narrower web frame and mark for biscuits.

STEP 14. Cut the biscuit slots, then glue and clamp it in place.

STEP 15. Build the drawer guide by gluing and clamping the 3/4″ X 3/4″ facing strip to the end grain of the piece that measures *15 3/4 X 6 3/4"*.

STEP 16. Glue and screw the drawer partition in place as laid out in the drawing and top photo page 82. You can screw downward through the upper web and upward through the one below. The partition will also double as the two center drawer guides.

STEP 17. Build the drawer guides

STEP 18. Glue and screw the drawer guides to the carcass.

STEP 19. Turn the feet to the dimensions shown in the drawing.

STEP 20. Bore a 3/4" hole, 1" deep, in the top center of each foot to take the dowel that will secure the foot in place on the bottom of the washstand.

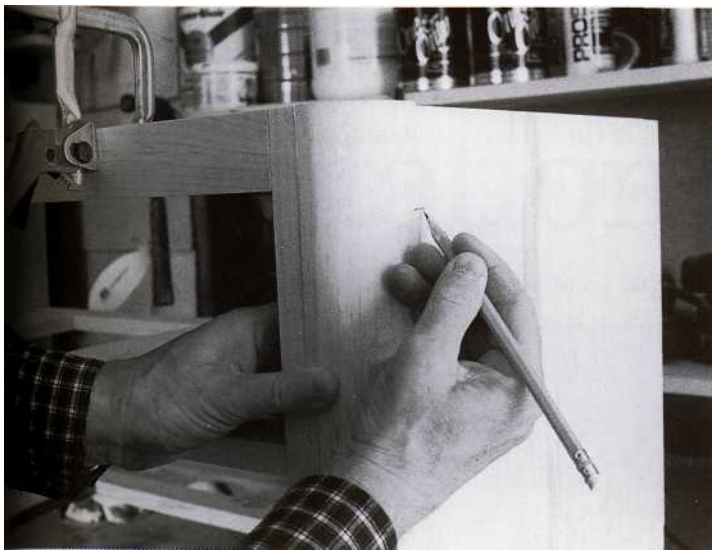
STEP 21. Using a 1/2″ bit in your router, round over the front and side edges of the two boards that will be the top and kicker.

STEP 22. Bore four 3/4" holes at each corner of the kicker as laid out in the drawing.

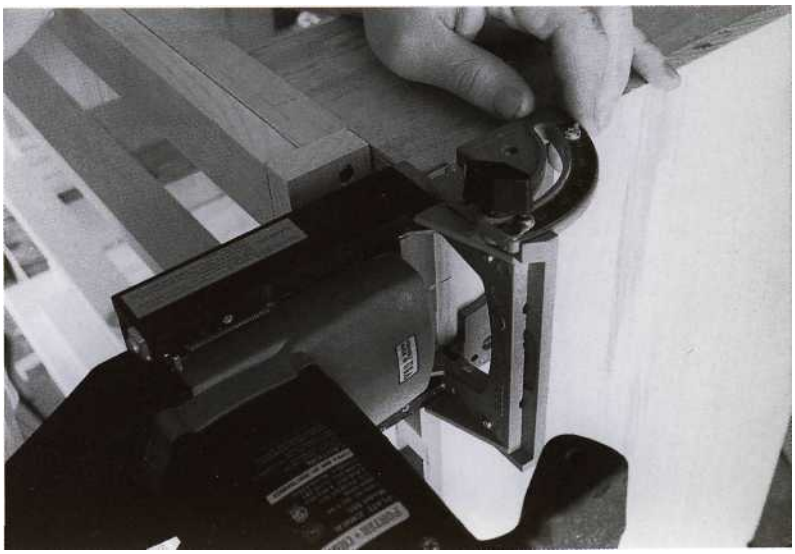
STEP 23. Using one of the new polyurethane glues and four pieces of 3/4" x 1 3/4" dowel, assemble the feet to the kicker. Clamp and set aside overnight to fully cure.

STEP 24. Remove the excess glue from around the feet.

STEP 25. Take the three pieces that will make the gallery and cut one end of both of the short sections and both ends of the long piece to an angle of 10° as laid out in the drawing.

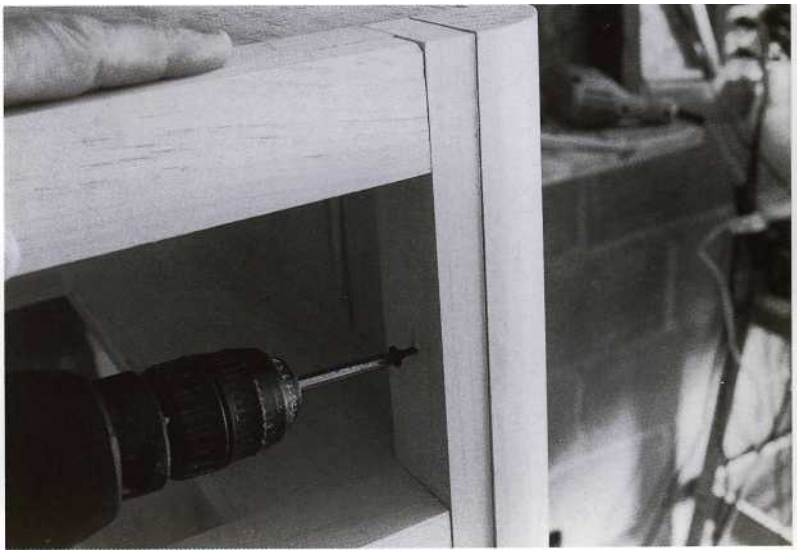


Once the spacers are securely fastened to the carcass, set the pilasters in place and mark them, one side only, and the carcass for biscuit slots.



Cut the biscuit slots to the pilasters and side panels

Take extra care to ensure the plate jointer is square to the work when milling the biscuit slots to the pilasters.



Glue the pilasters in place to the sides of the carcass and, from the inside, using glue and no. 6 screws, secure the pilasters to the spacers already screwed in place.

STEP 26. Using either your jointer or table saw, cut the bottom edges of all three pieces to 10° to give the gallery the desired tilt. Make sure you have a left and right section with the angle at the back.

STEP 27. Using the scale drawings, cut the details to the upper edges of the three gallery sections. The angle should be at the back of both end sections.

STEP 28. Cut rabbets 3/8" deep X 3/4" wide to the ends of the back section of the gallery as you see in the drawing.

STEP 29. Glue, nail with cut-steel nails and clamp the side of the gallery to the back (make sure the assembly is square), and set aside overnight to fully cure.

STEP 30. From the inside, screw the kicker (base) to the lower web frame of the carcass. Elongate the holes in the carcass and use small washers under the heads of the screws to allow for movement in the kicker.

STEP 31. Set the gallery in position on the top and mark the outline lightly with a pencil.

STEP 32. Remove the gallery from the top and, using the pencil lines as a guide, bore pilot holes through the top at an angle of 10° to line up with the angle of the tilted gallery.

STEP 33. Replace the gallery and secure it in place with screws from the underside.

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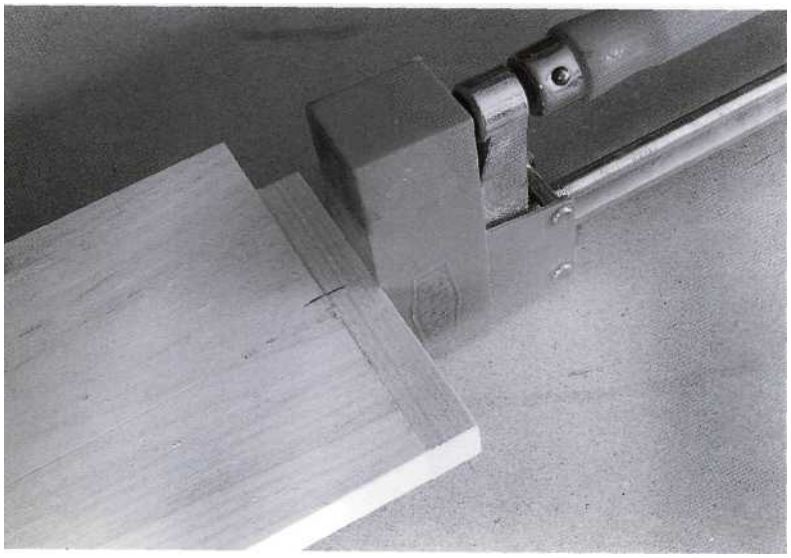


Using a #20 biscuit, fasten the face piece to the front edge of the drawer divider; note the offset.

Use *3/4"* dowel and one of the new polyurethane glues to fasten the feet to the kicker.

STEP 34. Set the top in place on the carcass and secure with screws from the underside of the top web frame. Elongate the holes and put small washers under the heads of the screws to allow the top room to breathe.

STEP 35. Set the back in place inside the rabbets and secure in place with a few brads.

STEP 36. To build the drawers follow the procedure as laid out in the Shop

STEP 37. Go to finishing.

FINISHING

I chose a scrubbed pine look for this piece (see chapter three). First you'll need to finish sand the entire piece, then do a little light distressing and finally apply some stain. I used Minwax's Golden Pecan. It gives the pine a delicate patina that shows through the polyurethane/ paint solution quite nicely for a really authentic look. When you apply the finish, simply wipe it on and then wipe it off again, leaving only the barest film of pigment over the stain.

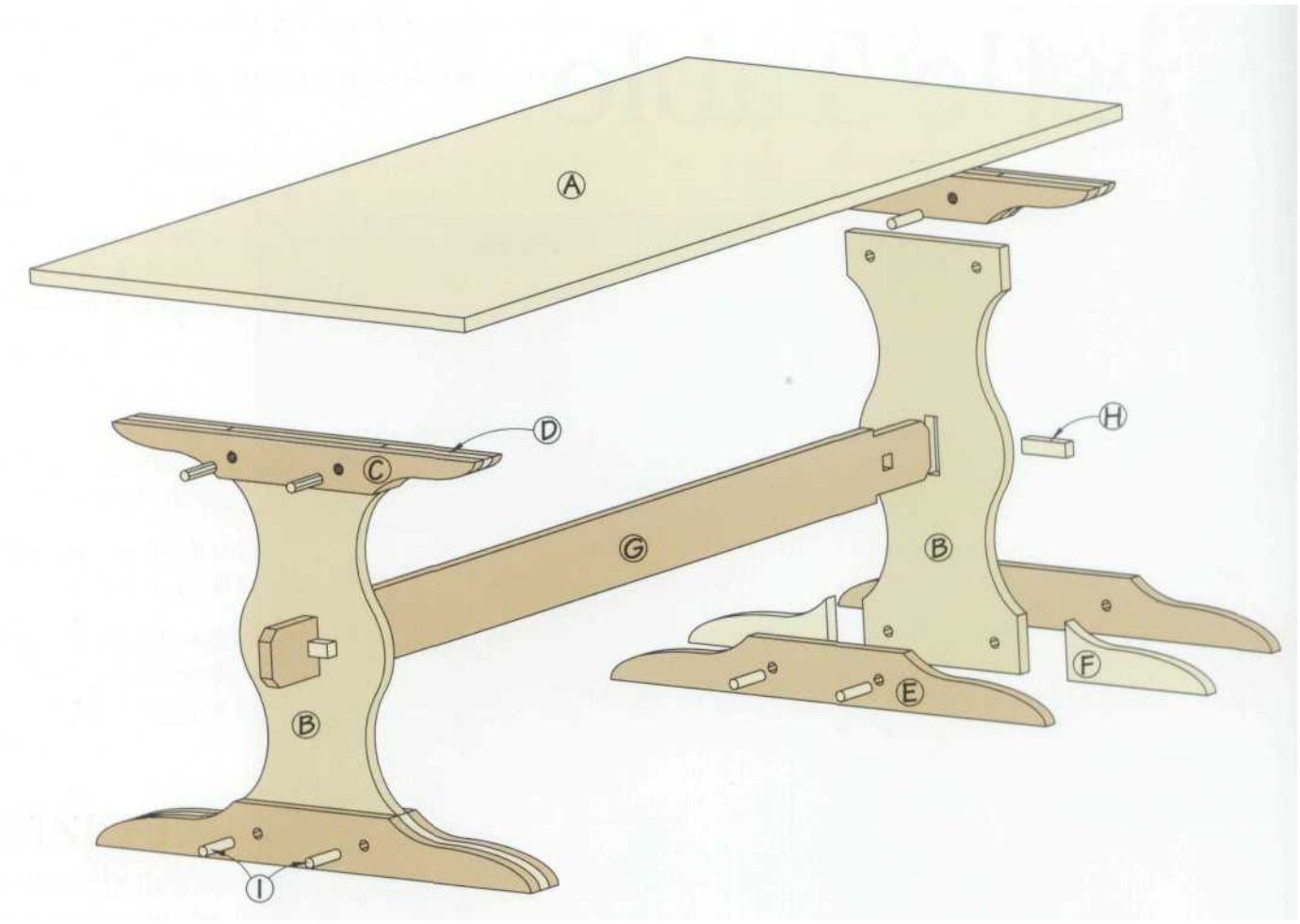
SHOP TIP

Making Drawer Guides

I make almost all of my drawer guides by taking two pieces of stock of the appropriate length and gluing and screwing them together (see the drawing). The guide piece should be made from a stock ¾″ × 1″ and the support from a section ¾″ × 2″—sometimes it will need to be wider. Glue the edge of the guide section, assemble it to the support section and secure the resulting assembly with a couple of screws.

Trestle Table

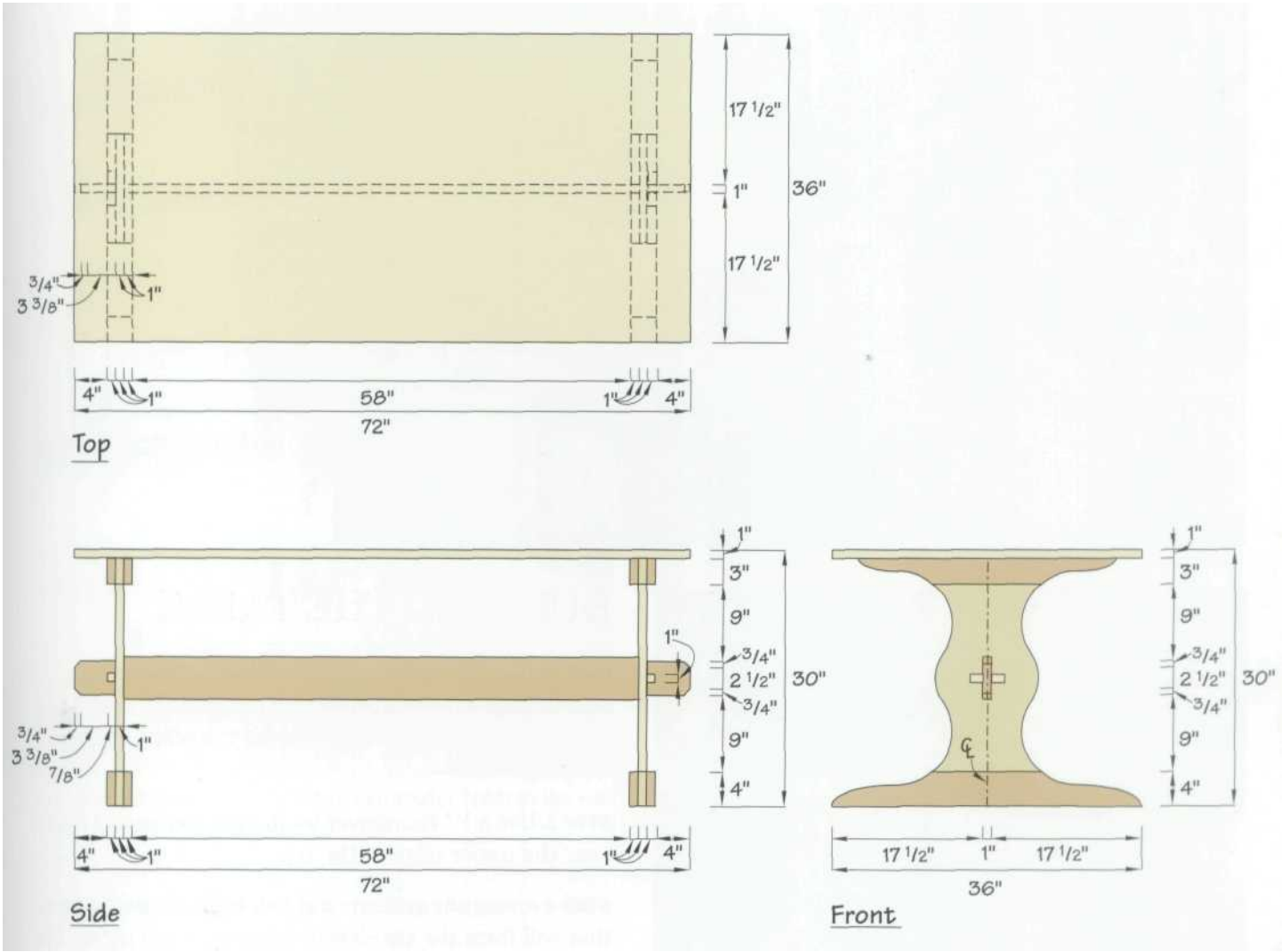
The trestle table as it was in Colonial times was a large, functional piece up to 12' feet long by 24" to 36" wide supported by two or three heavy T-shaped trestles, hence the name. As you can imagine, it was a hefty piece—solid, substantial and probably the focus of whatever room in which it was placed. Each trestle rested on a blocklike foot, beveled from the ends to the upright, known as a shoe foot. Later, with the introduction of the cyma curve, the feet, cleats and legs became things of beauty. The trestles were connected by a single stretcher or rail that passed through mortises midway up from the floor. These were held in place by wooden pegs. Tables like this became popular in the mid-1600s and were used mostly in the kitchens of large houses, in churches as communion tables and in other public buildings. They remain popular today, and the basic design has changed very little. The larger versions were made of oak; the smaller ones usually of pine (some had a pine top and a maple understructure). Smaller versions, often made on farms, measured four to six feet in length. Few originals have survived the centuries. Those that have are found mostly in museums. Ours is the farmhouse version—6' long X 3' wide X 30" high.



CONSTRUCTION OUTLINE

The table is made exclusively from furniture-grade pine. The top is made from three pieces of stock a full 1" thick. The growth rings are alternated to ensure a more stable structure. The trestles and stretcher are made from the same 1" stock. The cleats and feet employ extensive use of the cyma curve. Each is made from four pieces of stock, all 1" thick, sandwiched together to make a solid base.

The method is straightforward and lends itself nicely to simple construction techniques. The construction of the feet and cleats provides ready-made mortises into which the legs tightly fit. The three pieces of stock that form the top are biscuited together, but you can use dowels if you prefer. The legs are cut from a single piece of stock 12" wide x 1" thick x 29" long; again, the design of the legs makes good use of the cyma curve. The legs are set into the feet and cleats and held in place with 3/4″ dowels, which are in turn permanently fixed in place with one of the new polyurethane glues. The top is attached to the legs using no. 10 x 3" wood screws.



MATERIALS LIST

Trestle Table

No.	*Letter*	*Item*	*Dimensions T W L*
1	A	Top	1″×36″×72″
2	B	Legs	1″×12″×29″
4	C	Cleat	1″×4″×30″
4	D	Cleat	1″×4″×9″
4	E	Feet	1″×5″×36″
4	F	Feet	1″×5″×12″
1	G	Rail	1″×5″×72″
2	H	Pegs	1″×1½″×4″
8	I	Pegs	¾″dia.×3″

SHOP TIP

Storing Biscuits

You'll keep your biscuits out of the damp, stopping them from swelling and making assembly much easier, if you keep them in an air-tight container. I use an old coffee can with a plastic lid.

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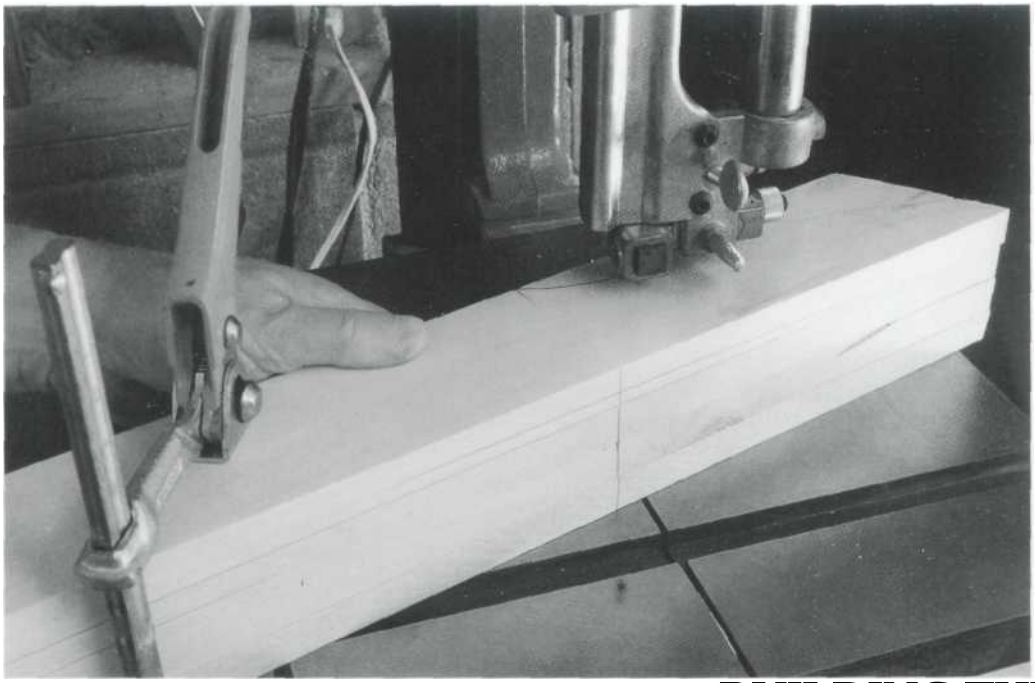


Use your band saw to cut the feet to shape

BUILDING THE TABLE

STEP 1. Cut all the pieces to size.

STEP 2. Build the board that will become the top. Alternate the growth rings to minimize the effects of warping.

STEP 3. Use a 1/2″ roundover bit in your router and **round** over the upper edge of the top.

STEP 4. Using the pattern, cut the eight shaped pieces that will form the two feet.

STEP 5. Using the pattern, cut the eight pieces that will form the two cleats.

STEP 6. Using the pattern, cut the two legs to shape.

STEP 7. Cut the mortises, one in each leg, that will accept the lower rail.

STEP 8. Cut the tenons, one on each end of the rail, as laid out in the drawing.

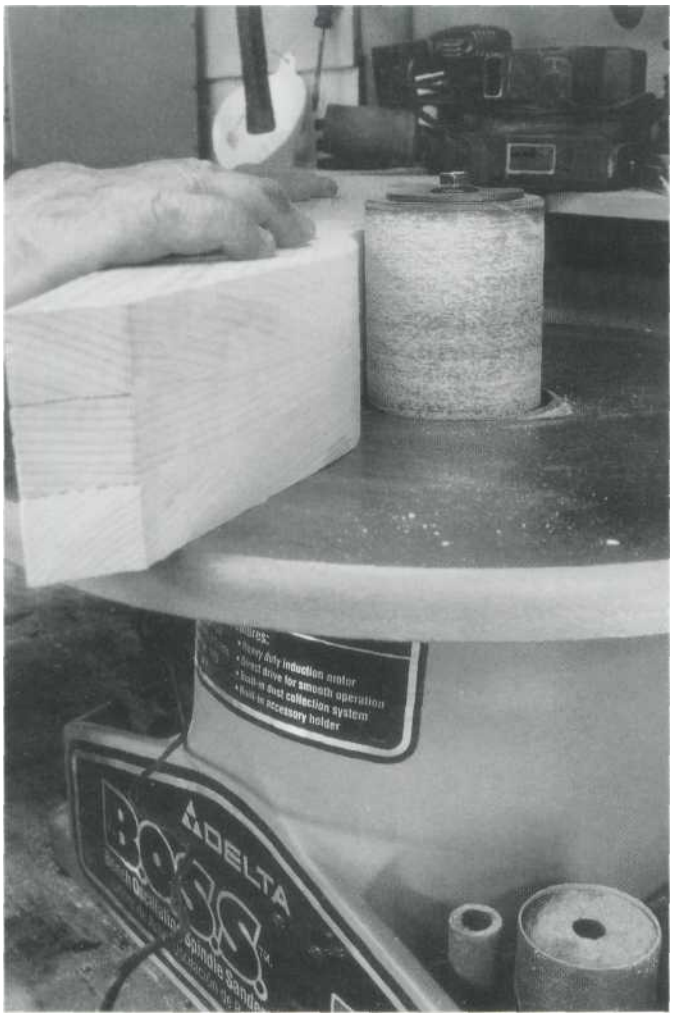
STEP 9. Cut the two mortises, one to each tenon, that will accept the retainer pegs.

STEP 10. Cut the two pegs to their final shape.

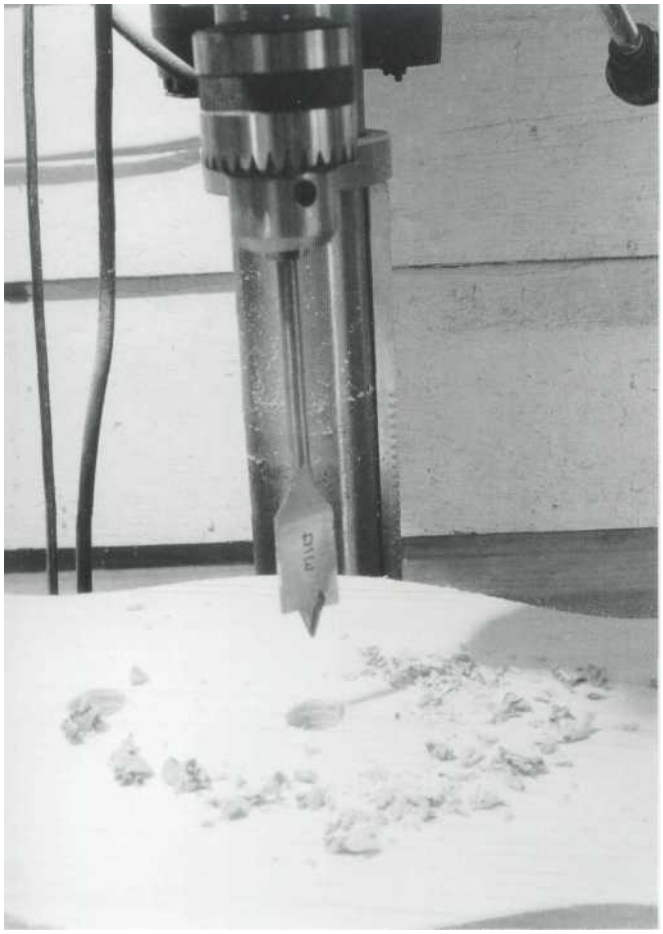
STEP 11. Sand all the pieces smooth and break all of the sharp edges.

STEP 12. Glue and clamp the feet and cleats (see photo) and set them aside to cure overnight.

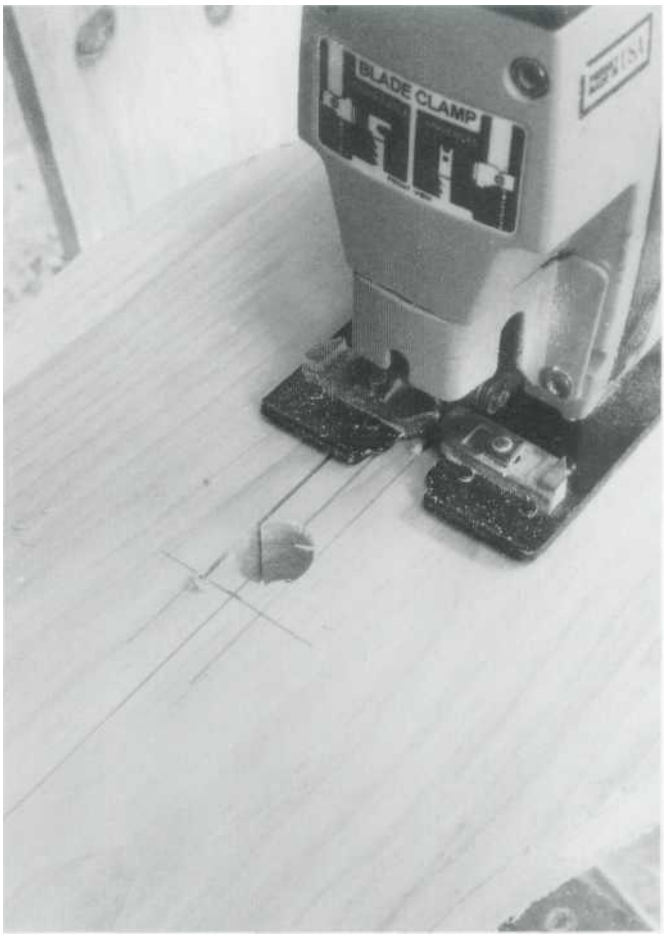
STEP 13. Use a 3/16" bit in your drill press to drill pilot



A spindle sander makes easy work of the final shaping of the feet.



Use your drill press and a 3/4" bit to mill starter holes in the legs for the mortise that will receive the rail.



Use your jigsaw to remove the rest of the waste material from the mortise.

holes in the feet and cleats to receive the screws that will fasten the understructure to the top.

STEP 14. Use a 1/2" Forstner bit to countersink the pilot holes to a depth of *1/2".*

STEP 15. Glue and set the legs in place inside the cavities in **the** feel and cleats.

STEP 16. Drill 3/8" dowel holes through the cleats and feet as laid out in the drawing.

STEP 17. Glue and set the dowels in place to strengthen the joints between the cleats, feet and legs (see photo).

STEP 18. Set the rail in place in the mortises between the two legs (see photo). Do not use glue.

STEP 19. Secure the rail in place using the two tapered pegs.

STEP 20. Set the top upside down on the bench and set the understructure in place on the underside of the top, making sure the assembly is equidistant from the ends and sides.

STEP 21. Using eight no. 10 X 3" screws, four to each cleat and two to each side, fasten the legs to the top.

FINISHING

The best way, I think, to finish this piece is to give it a natural pine look.

First, do your finishing sanding, then some distressing—heavier around the feet and the edges of the tabletop. Next, apply an appropriate stain. I like either-Bleached Mahogany by Blond-it or Puritan Pine or Golden Pecan by Minwax. To apply the stain, simply wipe it on and wipe it off; there's no need to let it stand. When the stain is dry, you can apply a little antiquing glaze. Don't overdo this; just a very light smear is enough. Finally, you can protect the piece by applying either a couple of coats of satin polyurethane or a couple of coats of Antique Oil made by Minwax.

Nineteenth-Century Butler's Tea Table

It's not been that long since every great house, and many not so great, both in England and America, had a butler. Some of them still do. In the domestic hierarchy the butler was at the top. He was in charge of running the house as well as being the first line of communication between the family and its servant staff. He also looked after most of the family's needs, organizing menus, cleaning and supervising the daily routine

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MATERIALS LIST

Butler Table

No.	*Letter*	*Item*	*Dimensions T W L*
1	A	Top	¾″×20″×30″
4	B	Legs	¾″×1¾″×1¾″
2	C	Apron	¾″×3″×27″
2	D	Apron	¾″×3″×17″
2	E	Gallery	¾″×3″×29″
2	F	Gallery	¾″×3″×19″

of the upstairs staff. His world was run from what was known as the butler's pantry—not a pantry in the true sense of the word, more a small office. He waited upon the family's every need, bringing the daily newspaper to the master of the house in the morning and serving all the formal meals—breakfast, lunch, dinner and, of course, afternoon tea. Afternoon tea in England, and to a lesser extent in America, was and still is a very important part of the day, especially among the upper class where it was always served by the butler. Afternoon tea was something of a ritual, taken casually in the parlor or, on fine days, outside on the lawns among the flowers.

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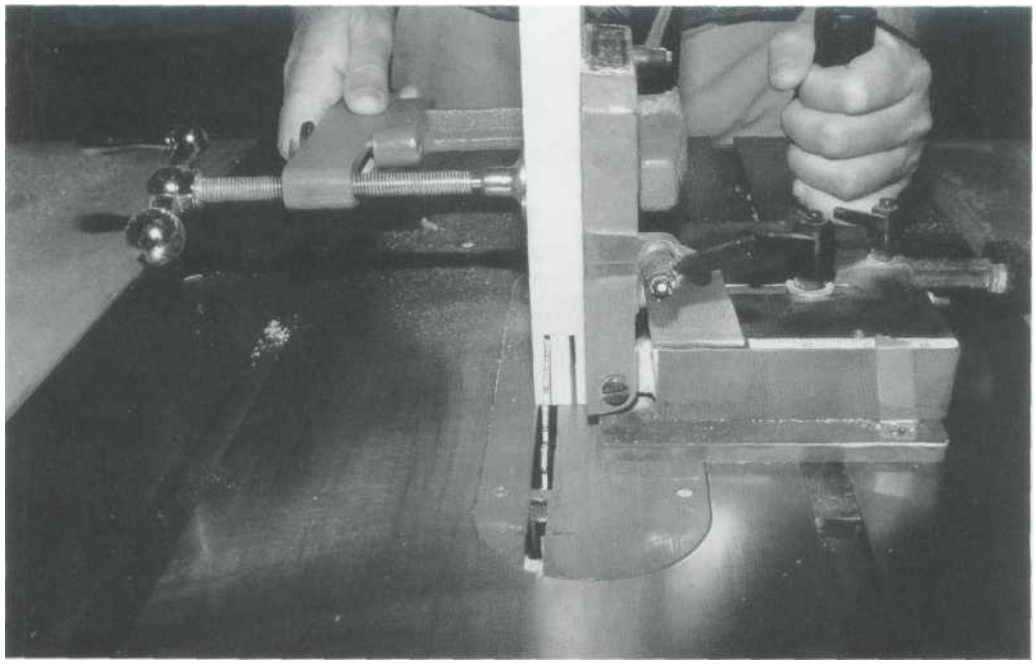


A tenoning jig is great for making quick, accurate tenons. You set the depth of cut for the blade, the position of the jig support plate, run the cut on one side, reverse the piece and run it, again, and then flip the piece end over and repeat the process.

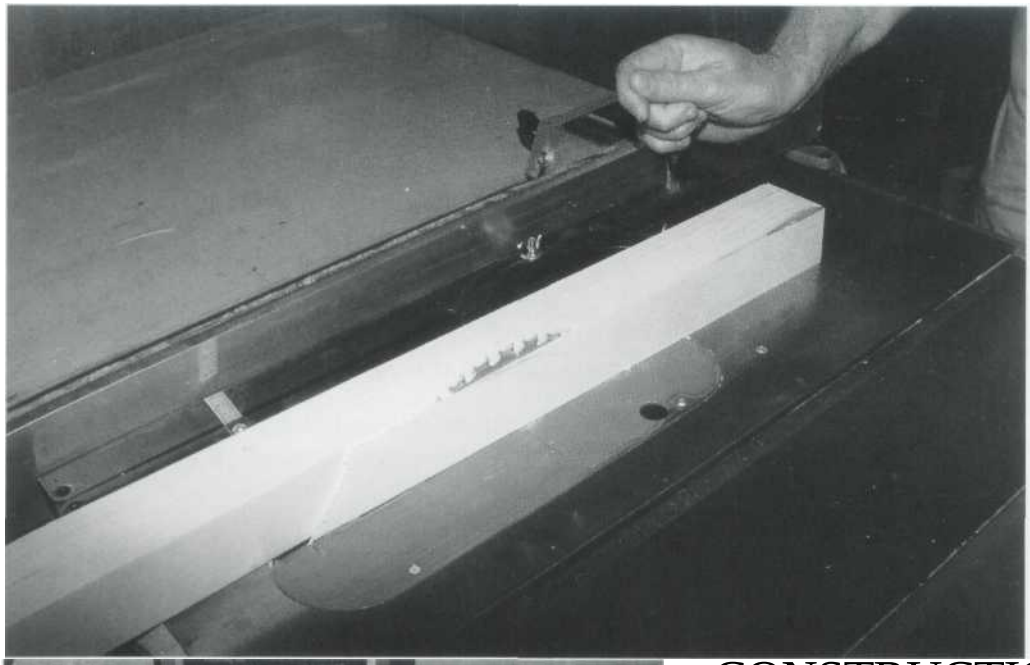
Set the depth of cut for your table saw blade to remove the waste and reveal the cheeks of the joint, and then, if your table saw has a movable rip fence, set it as a stop so you can make a consistently accurate shoulder cut. If not, you'll need to use a sacrifice fence.

It consisted of a pot of tea, small sandwiches and tea cakes, often scones and jam. All this was brought to 1 he family either on a large tray placed on a low table or a tray with legs of its own—a tea table.

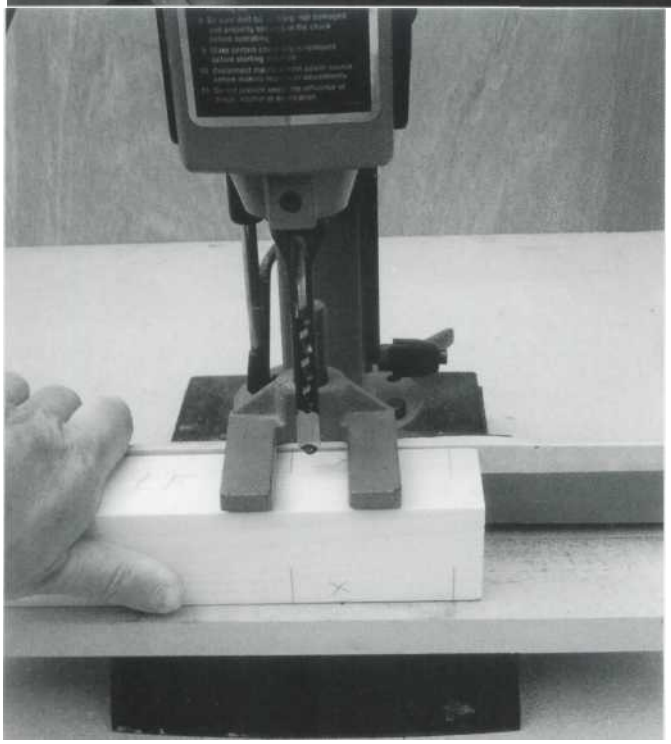
The earliest tea tables were simply that, small tables. Later they incorporated a low gallery pierced with handle holes. Those made around the middle to late nineteenth century had hinged sides, also pierced with handle holes, that stopped the goodies sliding off when the piece was being carried, but dropped flat when the journey from below stairs was complete, thus increasing the size of the tabletop.

It's the latter design you're probably familiar with and certainly see most often. Few of the earlier versions survived the centuries.

The early version of the butler's tea table was quite an elegant piece. Some had turned legs, some square and straight and some tapered. The gallery also took many forms. Some were no more than a rail that extended all around the edge of the tabletop, the piece being carried by placing the hands around the edges. Others were quite ornate. Ours incorporates the best of both worlds.



Use your tapering jig to cut the tapers to the legs. If you don't have one, it's a relatively simple job to make one



To be sure you mill the mortises in the correct position, it's best to lay out the legs before you start, and then mark the position of each mortise and each leg as left front, right front and so on.

CONSTRUCTION OUTLINE

This fairly simple project can easily be completed over a weekend. The construction for the legs and apron is mortise and tenon. The top is fastened to the understructure with screws in pocket holes. The gallery is fastened to the top also with screws. The gallery is constructed using dovetail joints at the corners, and the legs, being nicely tapered, are very much in the style of Hepplewhite.

BUILDING THE TABLE

STEP 1. Cut all the pieces to size.

STEP 2. Build the board for the top.

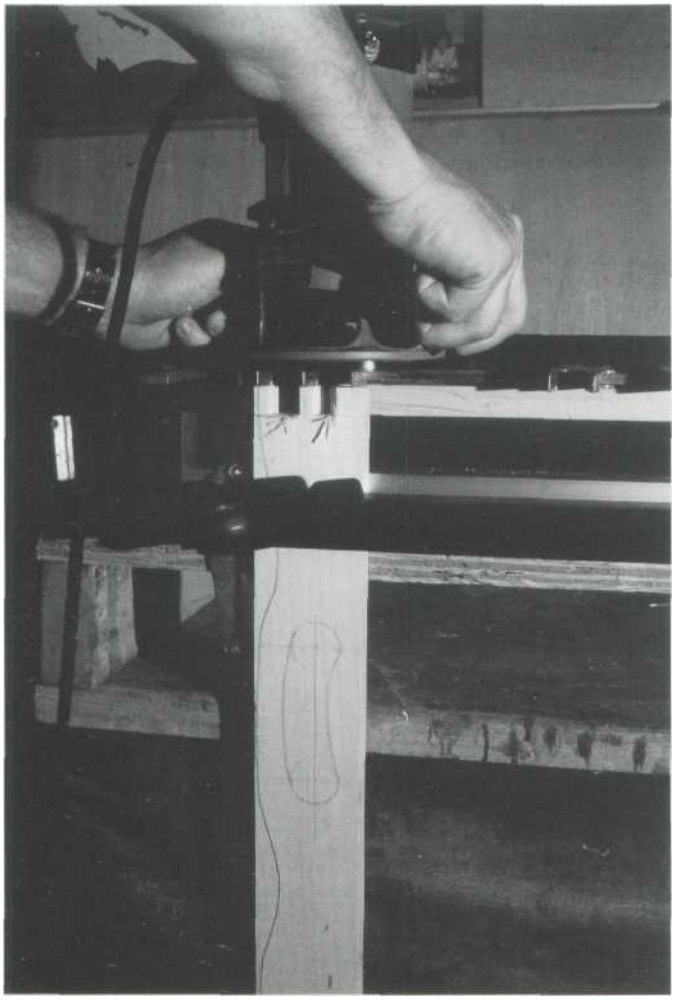
STEP 3. Using either the jointer, as I do, or the table saw and beginning 6" from the top, cut the tapers to two adjacent sides of each of the four legs. Be sure to cut two left- and two right-hand. The taper is roughly 2°.

STEP 4. Cut mortises 2" long X 3/8" wide X 1" deep to the tops of the tapered sides of all four legs. Set the mortises ½" from the top of the leg.

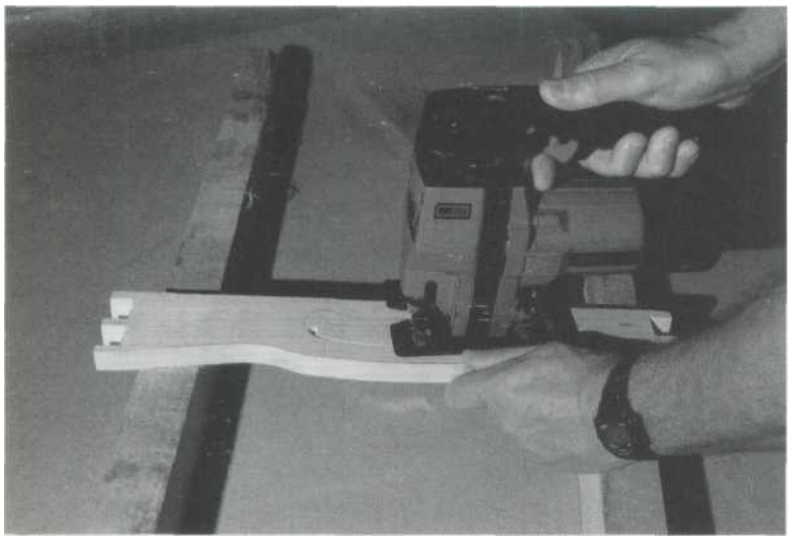
STEP 5. Mill tenons 2" long x 3/8" wide x 1" deep to the ends of all four pieces of the apron.

STEP 6. Dry assemble the pieces together to make sure you have a good fit, then disassemble them again**.**

STEP 7. Mill through dovetails to the ends of all four pieces that will make up the gallery.



It's best to mill the dovetails to the pieces of the tray section before you cut out the details.



To cut out the details to the handles and sides of the tray section, raise the pieces by using a couple of pieces of 2 x 4, and then use your jigsaw to remove the waste.

STEP 8. Dry assemble the gallery to make sure you have a good fit—the joints should be tight allowing for little or no movement between the pieces.

STEP 9. Disassemble the gallery and, using the pattern, cut the detail and handle slots to the gallery.

STEP 10. Sand all the parts smooth and break all sharp edges.

STEP 11. Apply an appropriate stain (I used Jacobean by Minwax) to all of the parts.

STEP 12. Glue, assemble and clamp the understructure and leave it overnight to completely cure.

STEP 13. Glue, assemble and clamp the gallery and leave it overnight to cure.

STEP 14. From underneath, using six no. 6 X 1 5/8" screws—two along each side and one at each end—fasten the gallery to the top. You should elongate the holes slightly to allow the top to breathe.

STEP 15. Mill six pocket holes to the upper inside edges of the understructure's apron. If you have a drill press you do this before you do the assembly (see drawing and photo).

STEP 16. Assemble the top to the understructure.

FINISHING

No big surprises here. I simply apply a half-dozen coats of seedlac over a couple of days and it's done.

SLANT-LID DESK ON FRAME

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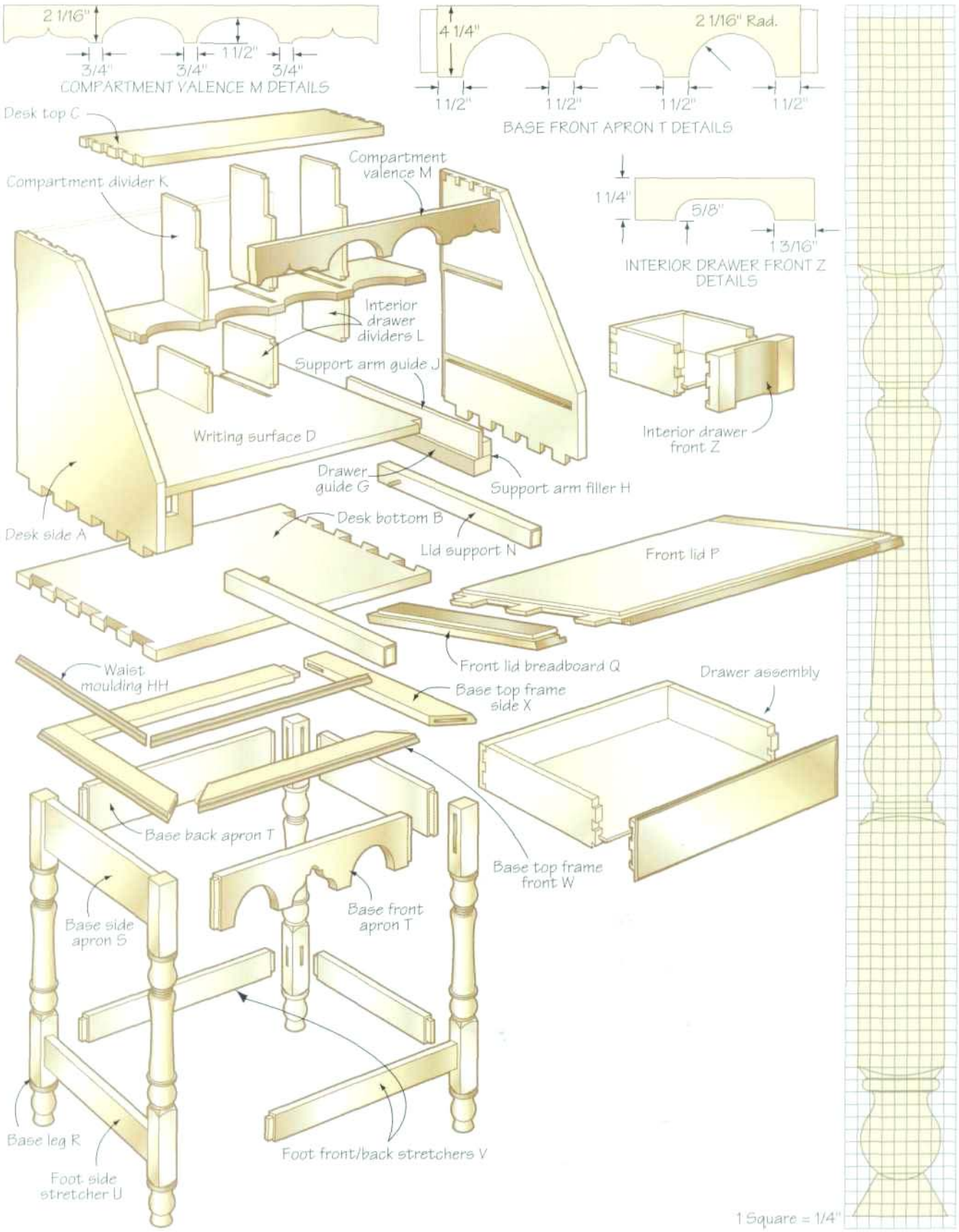

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SLANT-LID DESK ON FRAME

inches (millimeters)

REFERENCE	QUANTITY	PART	STOCK	THICKNESS	(mm)	WIDTH	(mm)	LENGTH	(mm)	COMMENTS
A	2	desk sides	tiger maple	3/4	(19)	17 3/8	(442)	18	(457)	
B	1	desk bottom	pine	3/4	(19)	17 3/8	(442)	23 3/4	(603)	tiger maple on front edge
C	1	desk top	tiger maple	3/4	(19)	8	(203)	23 1/4	(590)	
D	1	writing surface	tiger maple	3/4	(19)	16 3/4	(425)	22 5/8	(575)	
E	1	middle shelf	tiger maple	1/2	(13)	6 3/8	(162)	22 5/8	(575)	
F	2	face-frame dividers	tiger maple	3/4	(19)	1 3/4	(45)	4	(102)	
G	2	drawer guides	pine	7/8	(22)	1 3/4	(45)	15	(381)	
H	2	support arm fillers	pine	1	(25)	1 3/4	(45)	15	(381)	
J	2	support arm guides	pine	1/4	(6)	2	(51)	15	(381)	
K	3	compartment dividers	tiger maple	1/4	(6)	6 3/8	(162)	8	(203)	
L	3	interior drawer dividers	tiger maple	1/4	(6)	6 3/8	(162)	3 7/8	(98)	
M	1	compartment valance	tiger maple	3/8	(10)	2 1/4	(57)	22 3/16	(564)	
N	2	lid supports	tiger maple	15/16	(24)	1 3/8	(35)	18*	(457)	size to fit
P	1	front lid	tiger maple	13/16	(21)	15 5/8	(397)	21 1/4	(539)	1 1/4" (32) TBE
Q	2	front lid breadboards	tiger maple	13/16	(21)	2	(51)	16 1/2*	(419)	trim to size
R	4	base legs	tiger maple	1 3/4	(45)	1 3/4	(45)	24 1/4	(616)	
S	2	base side aprons	tiger maple	3/4	(19)	4 1/4	(108)	16 1/2	(419)	1" (25) TBE
T	2	base front and back aprons	tiger maple	3/4	(19)	4 1/4	(108)	23 1/2	(597)	1" (25) TBE
U	2	foot side stretchers	tiger maple	3/4	(19)	1 3/4	(45)	16	(406)	3/4" (19) TBE
V	2	foot front and back stretchers	tiger maple	3/4	(19)	1 3/4	(45)	23	(584)	3/4" (19) TBE
W	1	base top frame front	tiger maple	3/4	(19)	2 3/4	(70)	26	(660)	45° BE
X	2	base top frame sides	tiger maple	3/4	(19)	2 3/4	(70)	18 1/2	(470)	45° OE
Y	1	base top frame back	pine	3/4	(19)	2 3/4	(70)	22 1/2	(572)	1" (25) TBE
Z	4	interior drawer fronts	tiger maple	1 1/4	(32)	3 1/2	(89)	5 5/16	(135)	
AA	8	interior drawer sides	pine	3/8	(10)	3 1/2	(89)	5 1/8	(130)	
BB	4	interior drawer backs	pine	3/8	(10)	3	(76)	5 5/16	(135)	
CC	4	interior drawer bottoms	pine	1/4	(6)	4 7/8	(124)	4 7/8	(124)	
DD	1	large drawer front	tiger maple	7/8	(22)	4	(102)	18 5/8	(473)	
EE	2	large drawer sides	pine	1/2	(13)	4	(102)	13	(330)	
FF	1	large drawer back	pine	1/2	(13)	3 1/4	(82)	18 5/8	(473)	
GG	1	large drawer bottom	pine	9/16	(14)	13	(330)	18 3/16	(462)	
HH		waist moulding	tiger maple	1/2	(13)	3/8	(10)	6 lf	(1830)	
JJ	1	set of backboards	pine	1/2	(13)	16 3/8	(416)	22 3/16	(564)	trim to size

Note: TBE = tenon both ends; BE = both ends; OE = one end.

hardware

6	1/2" (13mm) Brass knobs with antique finish for small drawer and lid support	item #H-42	Horton Brasses	Reproduction nails
1 pair	1 1/2" × 2 7/8" (38mm × 73mm) Antique-finish drop-leaf hinges	item #H-510	Horton Brasses	1/4" × 1/4" (6mm × 6mm) Square pegs
2	Antique-finish drawer pulls	item #H-114	Horton Brasses	Drawer stops
1	Antique-finish drawer escutcheon	item #H-115E	Horton Brasses	#20 Biscuits
1	Lid lock	item #LK-20	Horton Brasses	Moser Medium Amber Maple stain
1	Antique-finish lid escutcheon	item #H-114E	Horton Brasses	400-Grit wet/dry sandpaper
	Square 1/4" (6mm) pins			Boiled linseed oil
	Glue blocks			Blond shellac
	1 1/4" (32mm) Slotted-head wood screws			#0000 Steel wood
	3/8" (10mm) Dowel			Behlen Wool-Lube
				Paste wax

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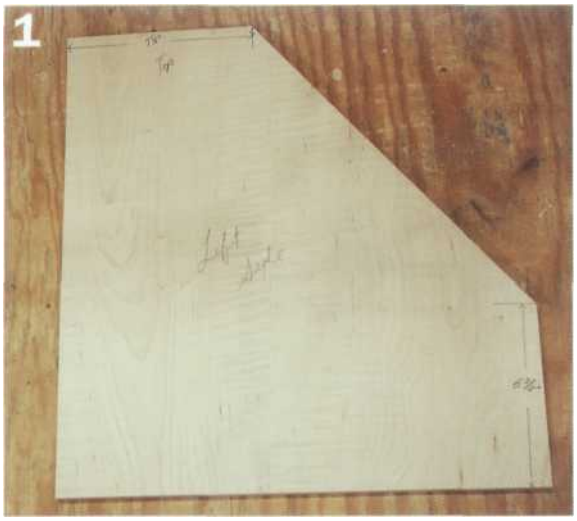
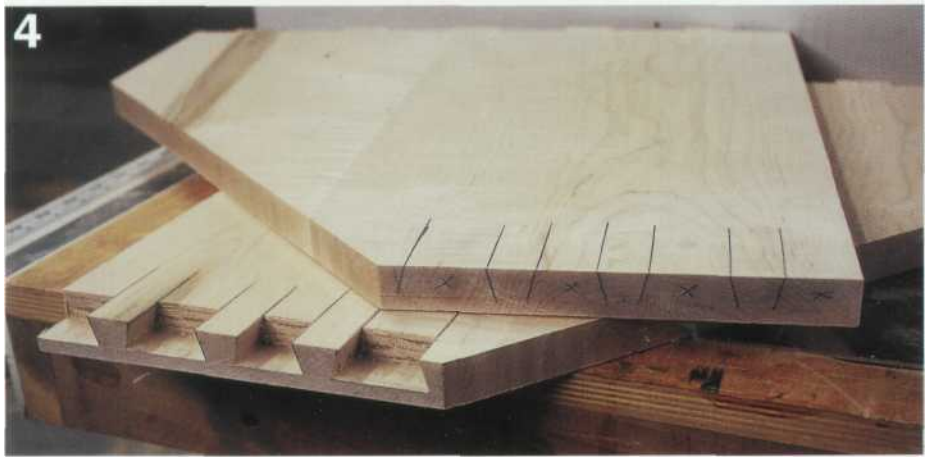


step 1 Begin this project by milling a pair of desk sides for the slant-lid portion of the desk. Identify the sides, making sure they are mirror images.

step 2 Lay out and form the pins on the desk sides, marking the depth to only 3/8". I make sure to end each side with half tails so that I can cut the rabbet for the back without stop-cutting (see step 7).

step 3 Cut the desk bottom to size, shown with the matching hardwood at the front and secondary wood making up the balance, and create a 3/8" x 3/4" rabbet at each end. Place the desk side in position and cut the corresponding tails. This detail allows you cover the dovetails with a small moulding and still keep the strength of the joint.



step 4 Lay out and cut the pins on **the** desk sides for the half-blind dovetails needed for the desk top. Again, leave a half tail at the rear

step 5 Mark the location for the vertical dado and create the stop-dado. I like to use a straight-edge and 3/4" pattern-cutting bit.

step 6 Cut the second dado for the middle shelf.

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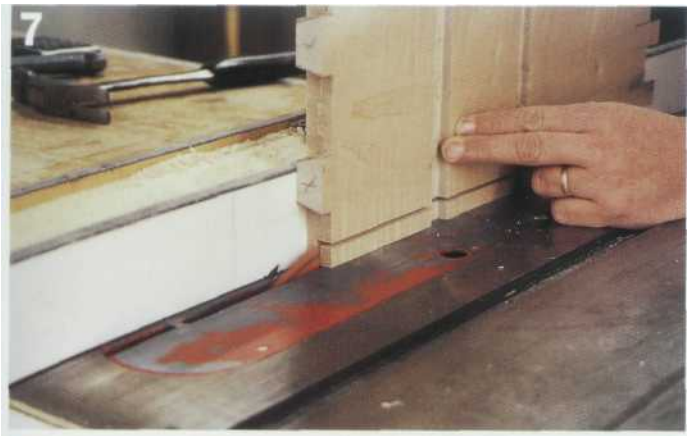
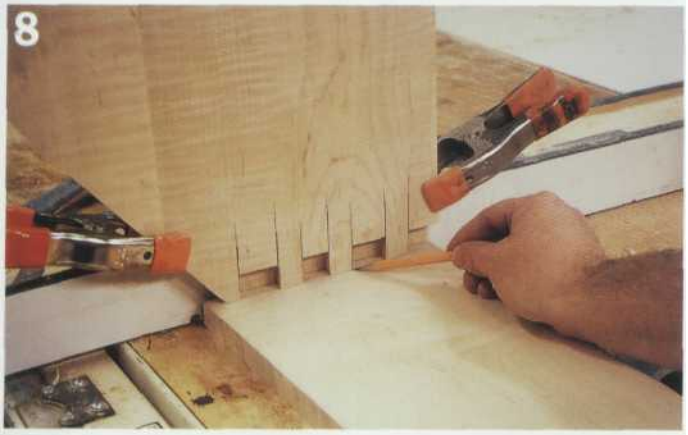
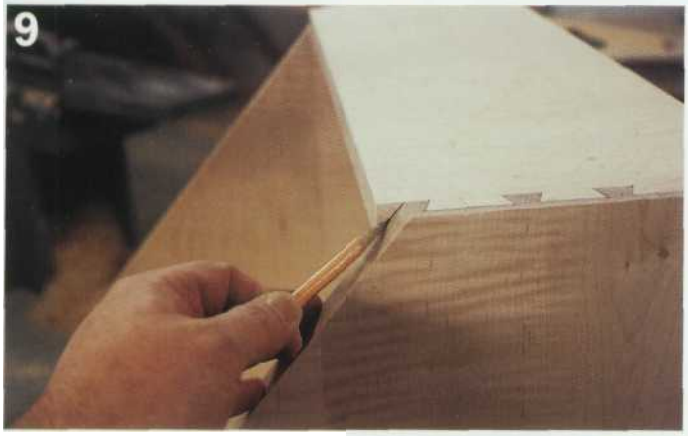


step 7 Next, make the rabbet for the backboards. I make two cuts on the table saw. First, set the blade height to 3/8" and move the fence 1/2" away **to** make **the** cut. Then reset the blade to cut 5/8" high and move the fence to 5/16". This is shown here and completes the rabbet. Make sure to cut the inside rear of each side.



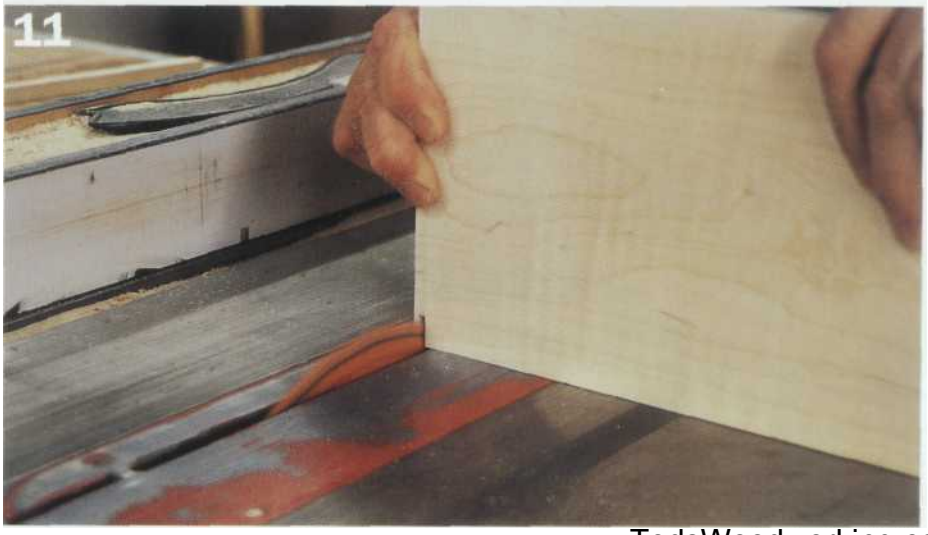
Step 8 With your desk top roughed to width and cut to length, invert the sides into place, transfer the layout for the tails and complete the **joint.**



step 9 Tap the top into place, mark the front edge and cut the piece to its final width.

step 10 Next, back cut the lower edge of the top with an angle that is 90° to the top front edge, leaving a 3/4" run at the first cut,

step 11 With the case temporarily together, cut and install the writing surface and middle shelf by notching the front edge to fit the stop dado cuts made earlier.



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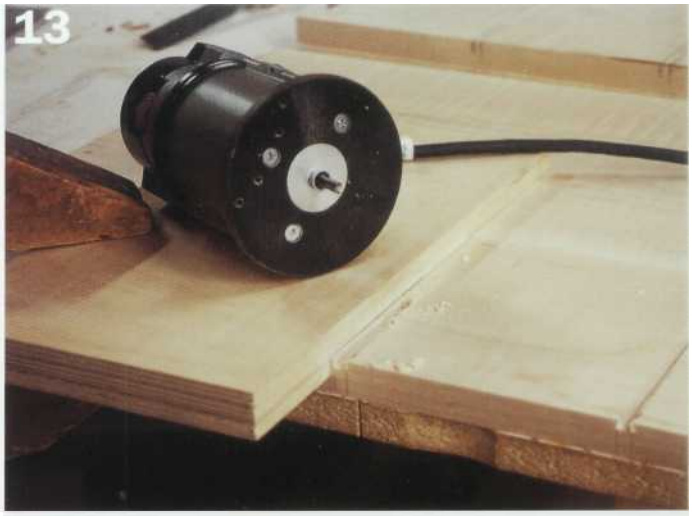
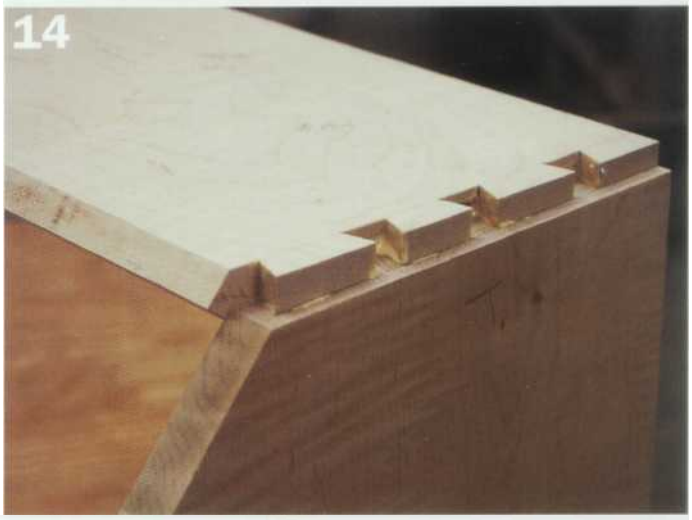
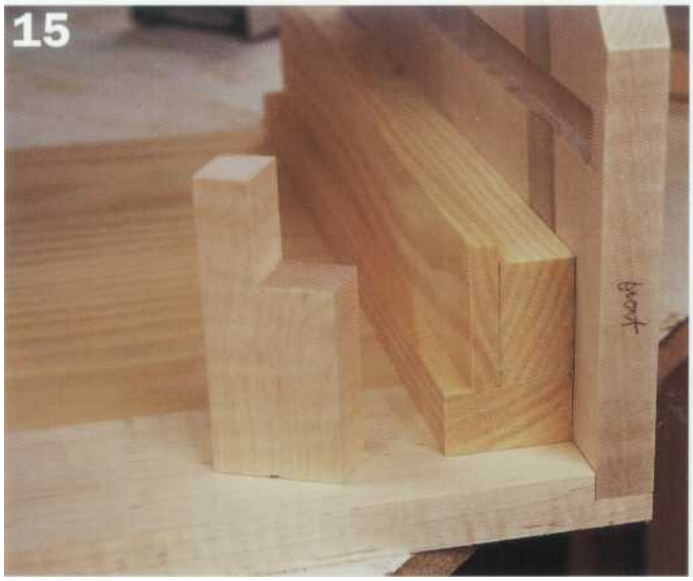
Step 12 Mark the location of the grooves tor the compartment dividers on the writing surface and underside of the desk top. Then use a straightedge to transfer the lines onto the other shelf.



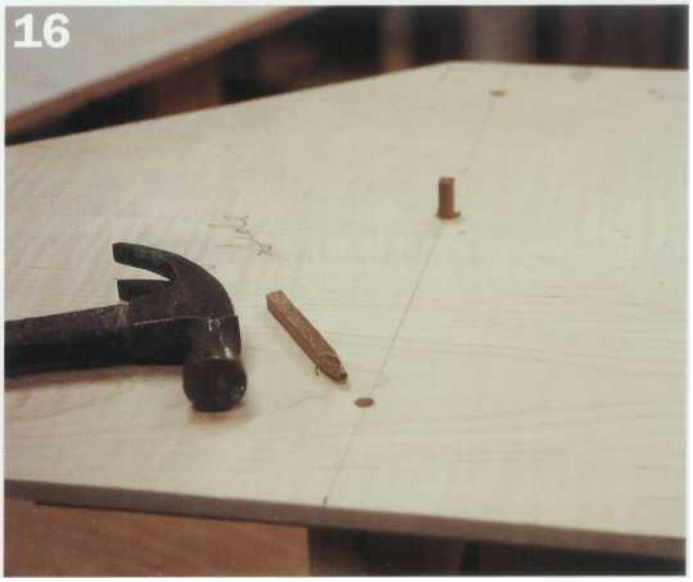
step 13 Dismantle the case and cut the 1/4"-wide dadoes for the dividers on the top of the writing surface, both top and bottom of the middle shelf and the underside of the desk top. Remember that all the cuts are stop-dado cuts and the cuts on the middle shelf are stacked over each other so they should be no more than 1/8" deep.

step 14 With the cuts finished, glue the case together.





Step 15 While the case is drying, take advantage of the access to install the interior drawer dividers and support arm guides as shown. Attach the drawer guides and the support arm fillers, then glue the front few inches and nail the assemblies into place. Finally add the support arm guides. Do not install the face-frame dividers at this time.



step 16 With the guide assemblies in place, slide the writing surface in and peg the piece through the side with 1/4"-square pins.

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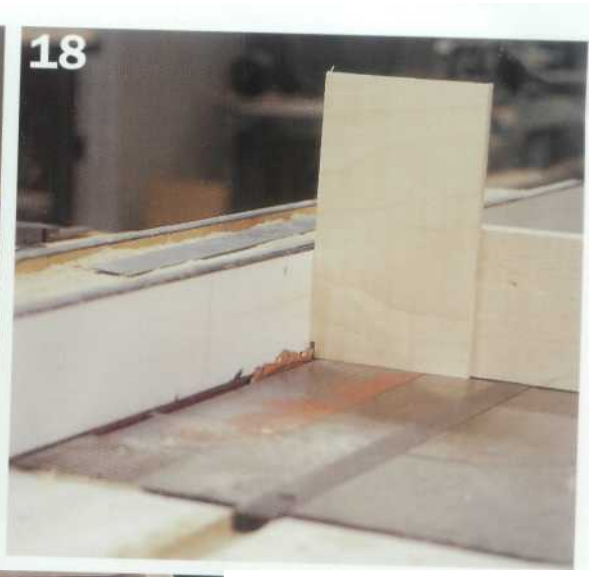
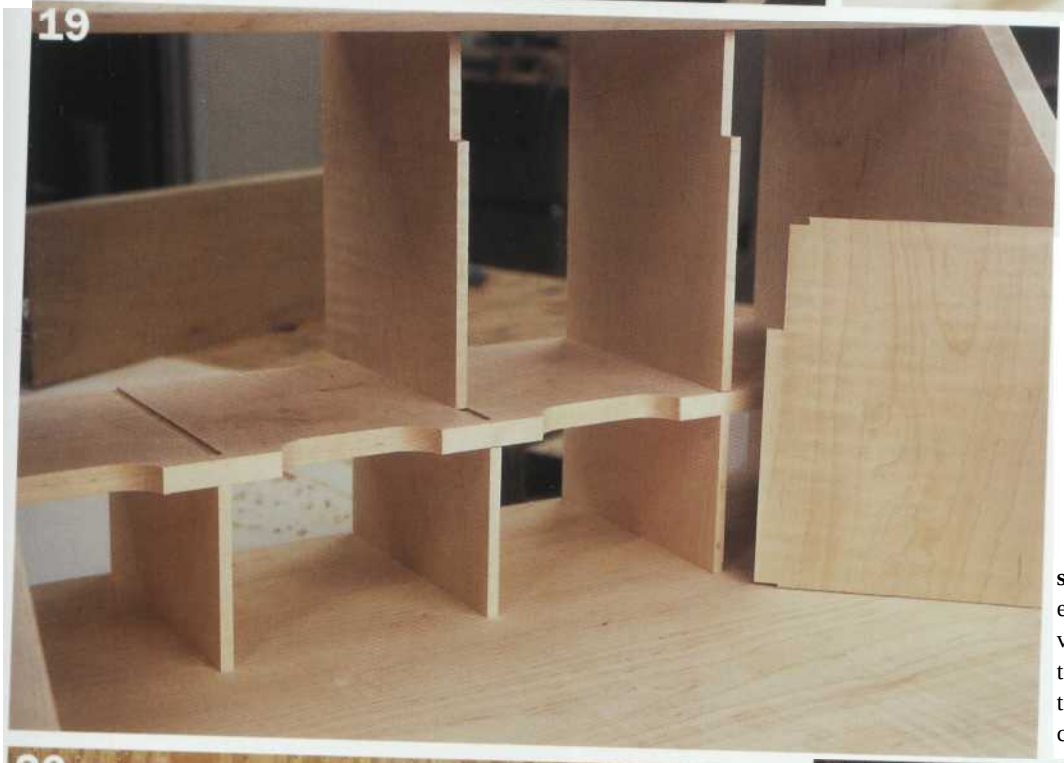
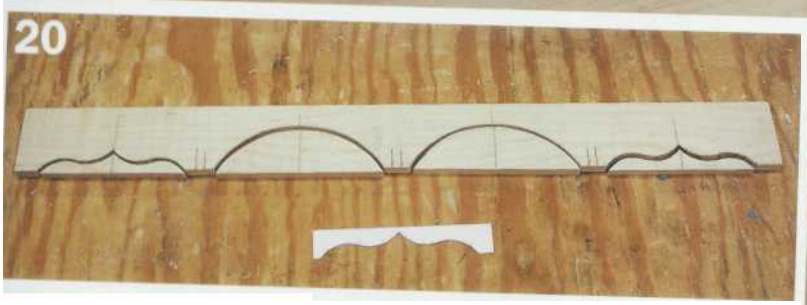




step 17 Next, create the blocked drawer area in the middle shell. Mark 3/4" from each compartment divider and use a 5/8" radius at each end of the area to be re moved. Cut it on the band saw and smooth the surface.

Step 18 Slide the completed middle shelf into the case. Measure and cut the interior drawer dividers to fit the stop-dado cuts by notching the front edge at the top and bottom.

step 19 With the drawer dividers fit, cut the compartment dividers the same, remembering to create a second notch at the top to accommodate the compartment valance.



step 20 fit the compartment valance to the case, then lay out the decorative cuts as shown: Make cyma curves for the outer compartments and radius cuts for the centers, allowing a 1/4" flat on each side of the dividers.

Step 21 Install the compartment valance with glue and small blocks.

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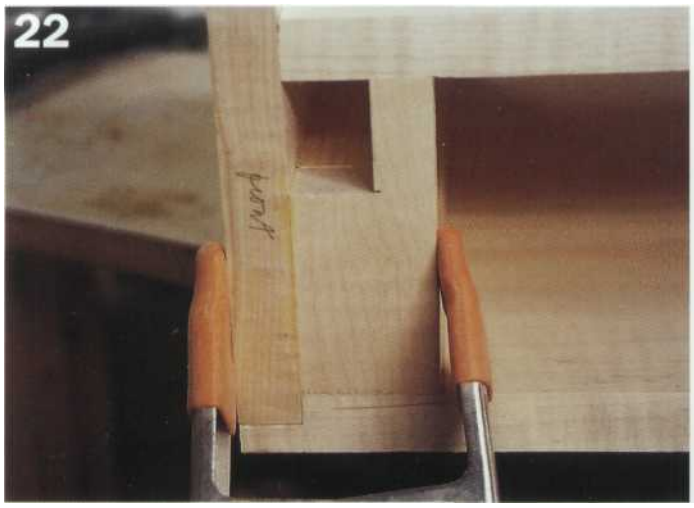
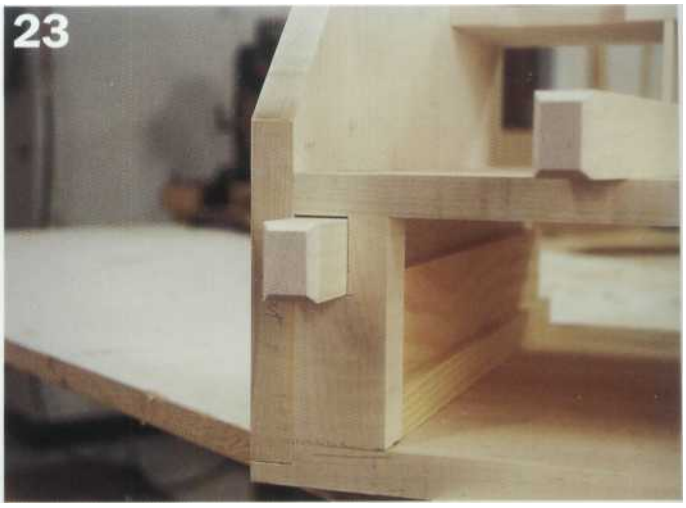
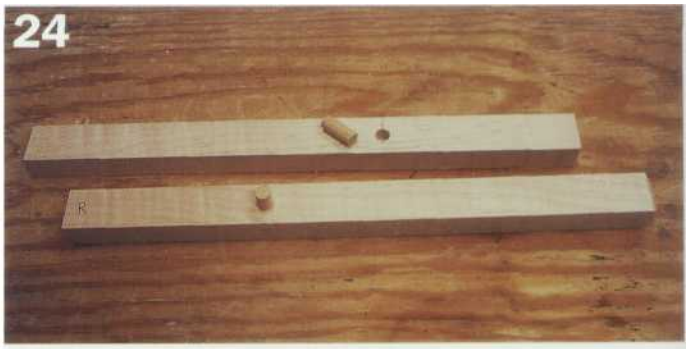


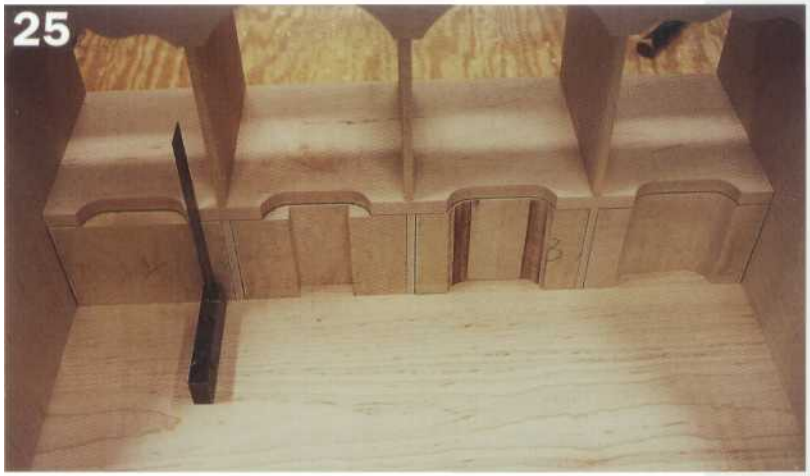
step 22 Next, glue the face-frame dividers into place and complete the installation with a screw through the bottom into the divider.



step 23 Mill the lid supports to fit into their respective areas. Create the beveled end on each support and fine tune the unit.

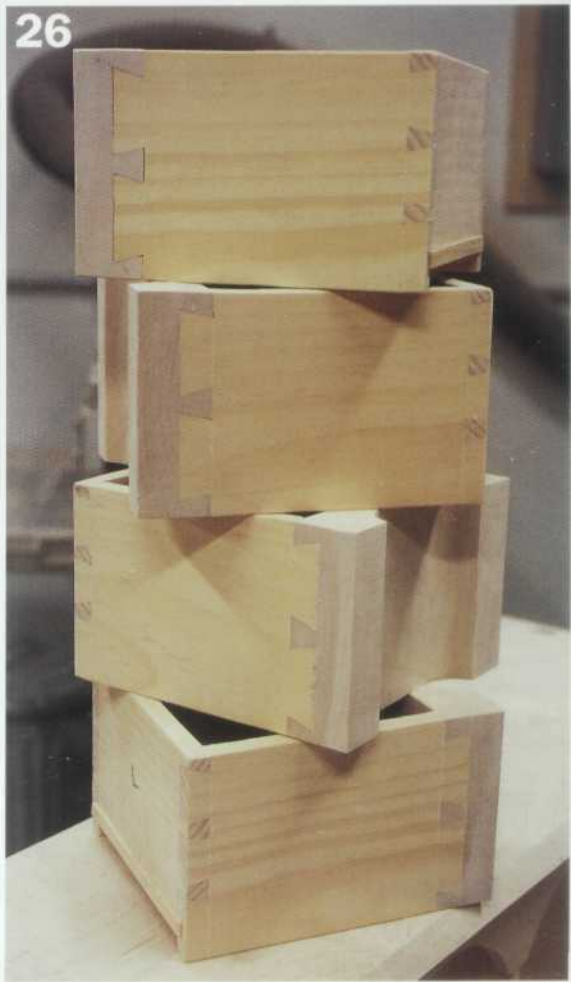
step 24 Mark the right and left lid supports and then drill for the 3/8" dowel on the inside face that will act as a stop. Place the hole so that a minimum of 10" extends out from the front.

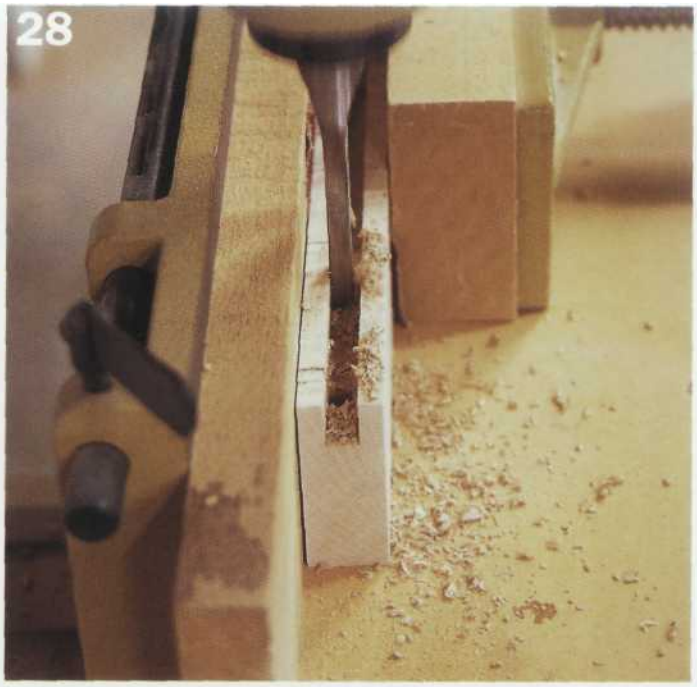




step 25 Build the drawers. This picture shows the tour steps to a finished drawer front. First, mill and fit the fronts in place. Use a small square to align the fronts, and mark the top edge by using the middle shelf profile as a guide. Next, use the table saw to remove as much waste as you can up to the scribe line. Then use the band saw to remove the rounded coiners. Finally, sand the area smooth.

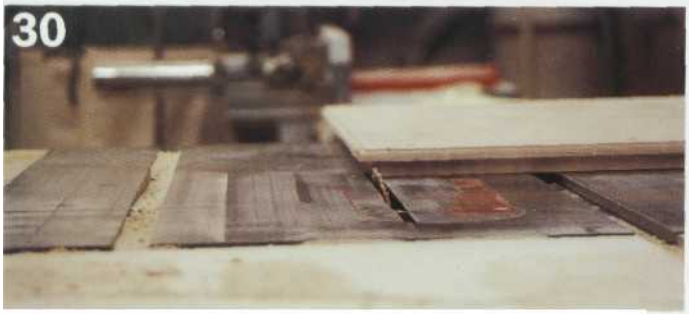
step 26 Complete the five drawer boxes. I use hand-cut dovetails and place the bottoms into the grooves set in the drawer sides and front. The bottoms of the interior drawers are attached with brads. In the large drawer, the bottom is nailed through a slot with a reproduction nail.

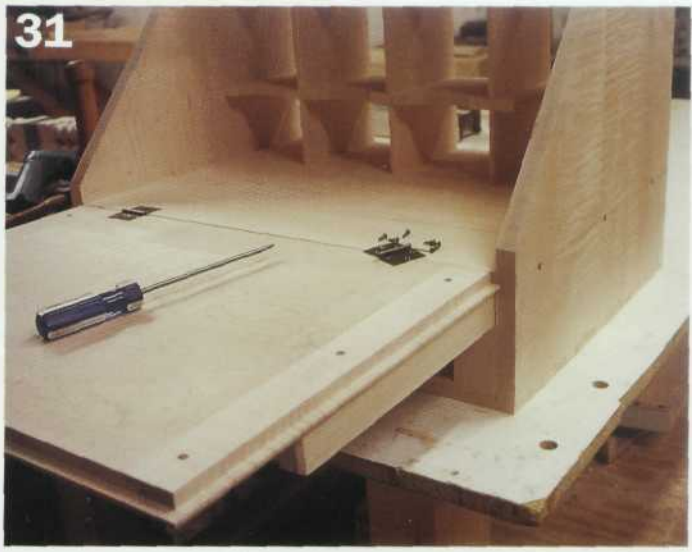


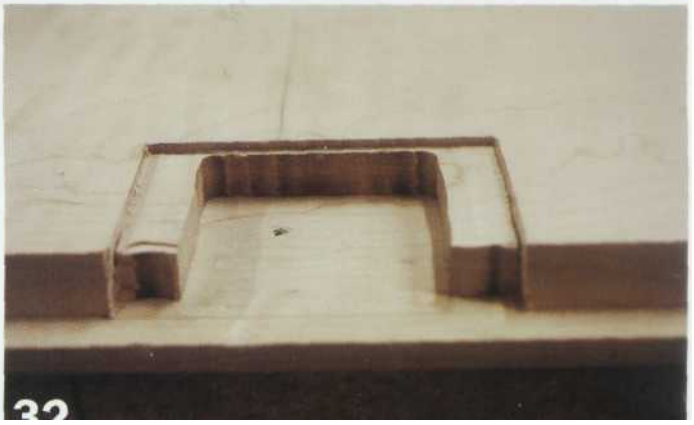


step 27 Mill the parts for the desk lid. Create the breadboard ends by cutting the tongue on the front lid and a 1/2" groove on the edges of the breadboard ends. (On a piece this size I generally make this cut on the table saw just as you would a tenon.) Then lay out the three extended areas that will accept the square pegs and remove the waste material.

Step 28 Transfer the marks onto the breadboards and create the mortises.







step 29 Slide the ends into place, damp and drill a 1/4" hole through each tenon. Remove the ends and elongate the outer holes, leaving the center round. Finally, glue the center area and drive square pegs into place, solidly gluing the center and placing glue only at the last 1/4" 1/4" the outer pegs to hold them in place.

step 30 Make the lipped edges on the lid sides. For the top edge, set the blade at the angle matching that of the desk top.

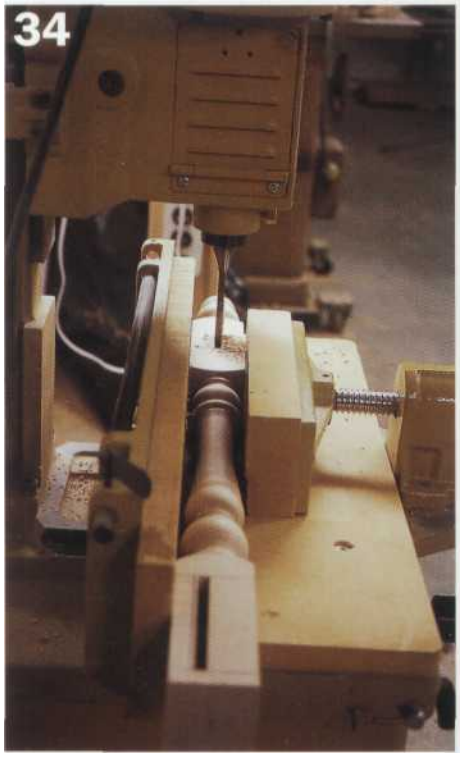
step 31 Mortise the writing surface for the lid hinges. Slide in the support arms, position the lid and transfer the hinge marks onto the lid. Finish installing the lid and hinges.

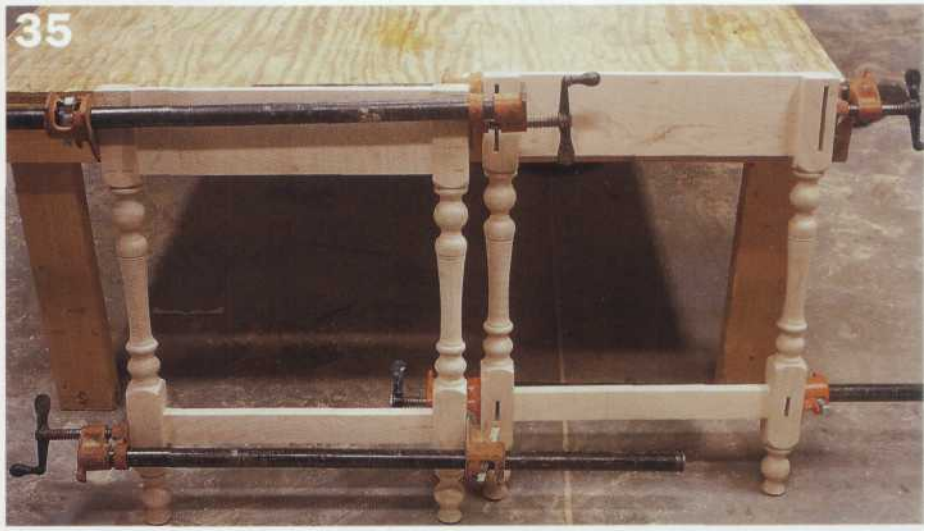
step 32 With lid installation complete, remove the lid and mortise and fit the lock.

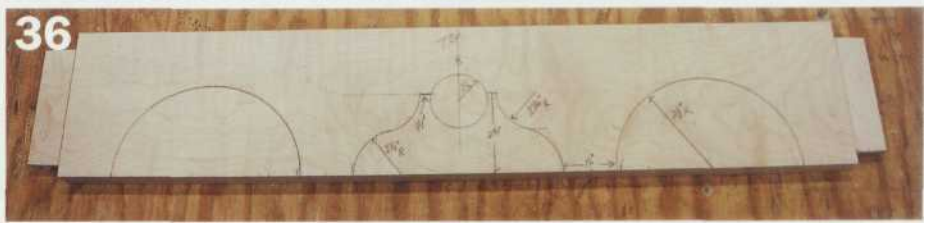
step 33 Glue and tack drawer stops to the back edge of the writing surface to align the drawer fronts with the middle shelf profile.

step 34 Turn the base legs according to the plan and create the mortises for the aprons (leaving a 1/4" reveal) and stretcher pieces (in the center of each leg).

step 35 Mill the aprons and stretchers to size, then make the matching tenons and assemble the two sides.







step 36 Lay out the design cuts on the front apron. Make the cuts, sand and finish the assembly of the base section, making sure to square the base.

step 37 Next, mill the pieces for the base top frame. Create the mortise-and-tenon joinery at the rear with 45° angle cuts and biscuits at the front edge. When ready, glue the frame. Once dry, sand the frame and create the moulding profiles.

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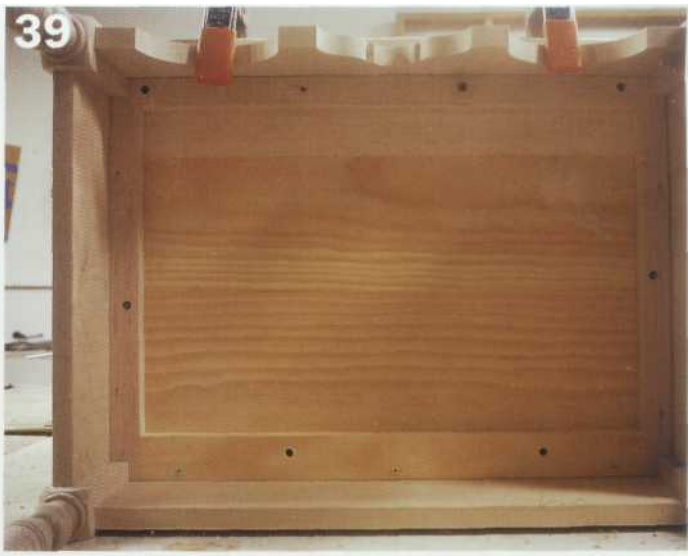


step 38 Attach the top frame to the base with reproduction nails and glue.

step 39 With the base complete, lay the desk and base on a flat surface and connect the two with 1 1/4" screws.

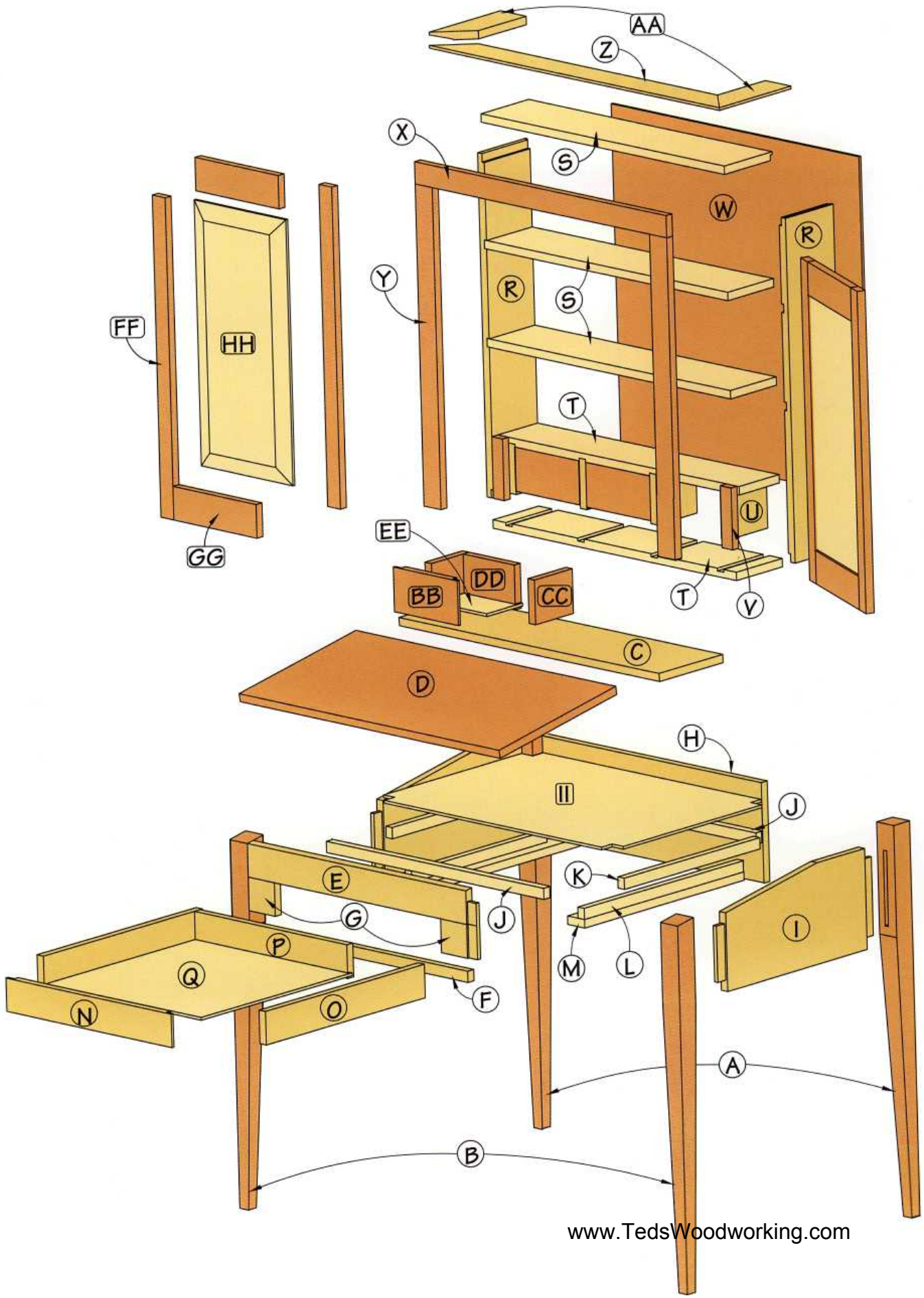
step 40 Turn the piece back onto its feet, then make and install the waist moulding. Final sand all parts, and it is off to the finish room.

step 41 I chose to finish this desk with an application of aniline dye (J.E. Moser's Medium Amber Maple). After a light sanding with 400-grit wet/dry paper, I brushed on a coat of boiled linseed oil, which deepens the graining. Next, I sprayed three coats of blond shellac, sanded completely and sprayed an additional two coats. After it sits for **a** day or two, I rub the finish with #0000 steel wool and Behlen Wool-Lube. Finally, I apply a coat of paste wax.

tip In making a frame as used in this project, or any frame of this design, it is important to have all pieces sized correctly to en sure that the frame is square. To correctly size the rear piece, cut the front piece to size, then lay out the material needed to create the tenons on the rear piece, as shown. Match the front piece to the rear piece and mark the cut line at the opposite end.

Plantation Desk

This type of desk first appeared around the turn of the nineteenth century. While the masters were turning out elaborate drop or fall-front secretaries, country furniture builders developed this much simpler style called a plantation or cupboard desk. Some were more elaborate than others. Some Shaker versions had fall-fronts that revealed several small drawers and a couple of pigeon holes: it was



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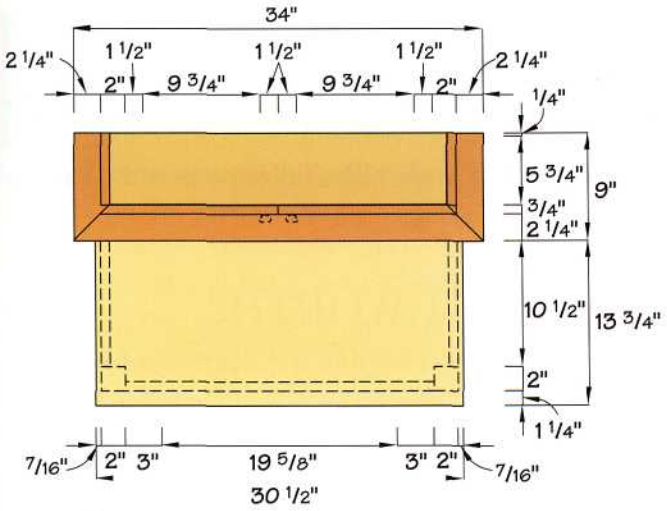
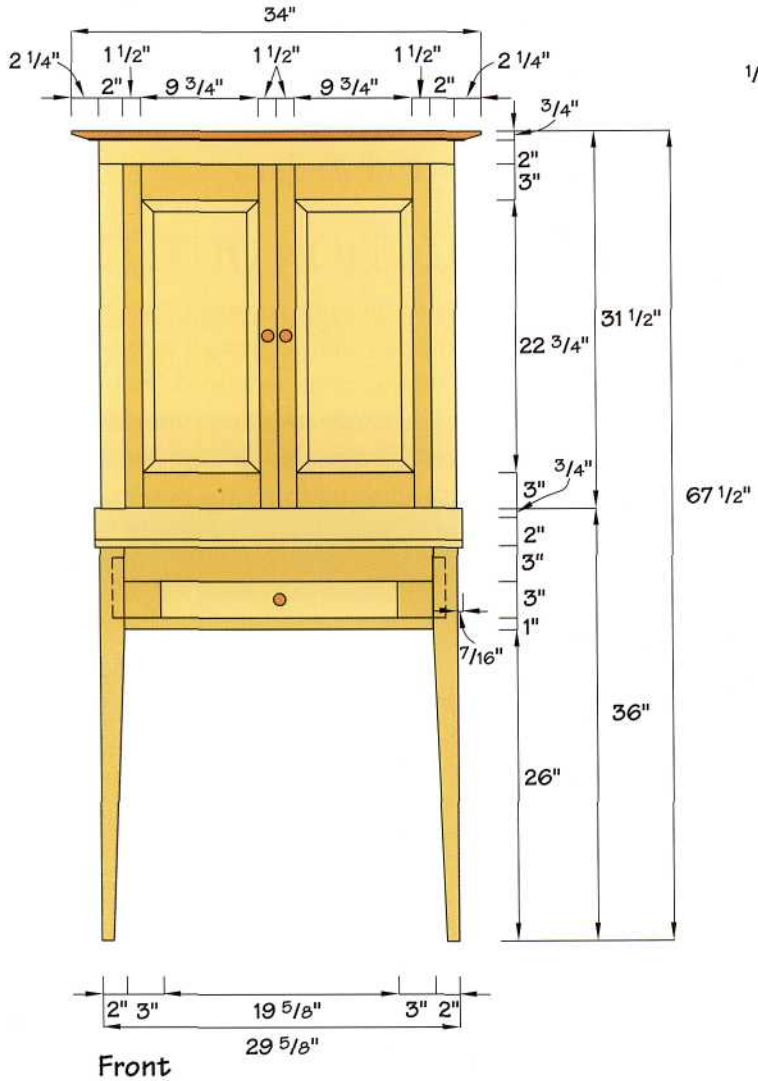
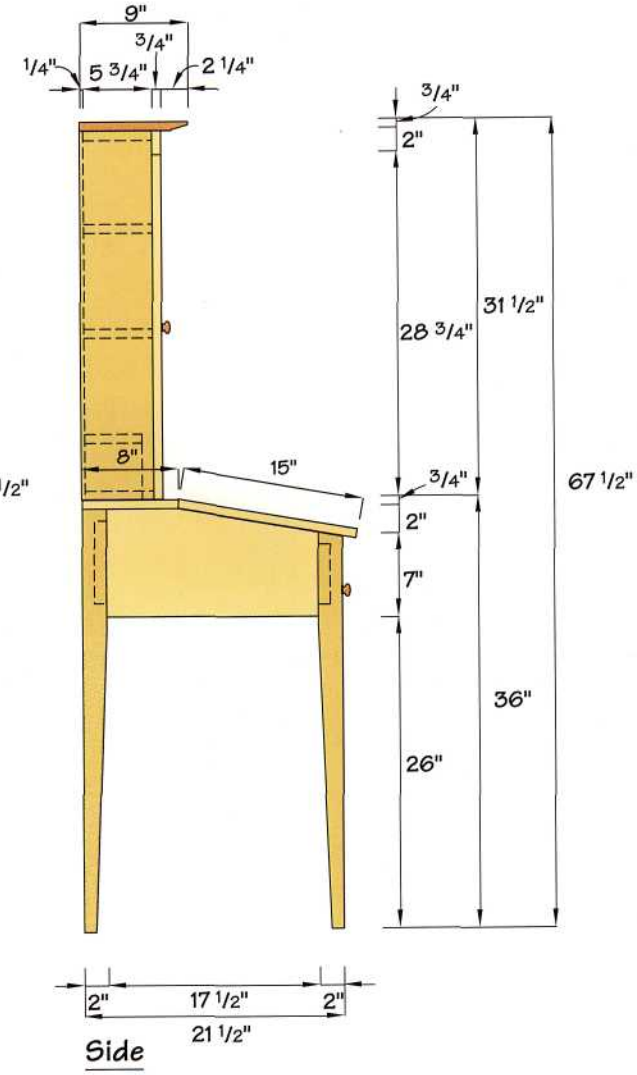


Top



Front



Side

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MATERIALS LIST

Plantation Desk

No.	*Letter*	*Item*	*Dimensions T W L*
2	A	Legs	2½″×2½″×35¼″
2	B	Legs	2½″×2½″×33″
1	C	Lid	1″×8″×30½″
1	D	Lid	1″×15″×30½″
1	E	*Front	¾″×3″×27⅝″
1	F	*Front	¾″×1″×27⅝″
2	G	*Front	¾″×3″×4″
1	H	Back	¼″×9″×27⅝″
2	I	Sides	¾″×9″×19½″
2	J	Cleats	¾″×1″×25½″
2	K	Cleats	¾″×1″×17″
2	L	Cleats	¾″×¾″×17½″
2	M	Cleats	¾″×2″×17½″
1	N	Drawer Front	¾″×3″×19⅝″
2	O	Drawer Sides	¾″×3″×19″
1	P	Drawer Back	¾″×2½″×18⅝″
1	Q	Drawer Bottom	¼″×18½″×18⅝″
2	R	Upper Sides	¾″×6″×30¾″
3	S	Shelves	¾″×6″×28½″
2	T	Drawer Section	¾″×5″×28½″
2	U	Dividers	½″×5″×4½″
2	V	Spacers	¾″×1″×5½″
2	W	Back	¼″×31″×30″
1	X	Trim	¾″×2″×29½″
2	Y	Trim	¾″×2″×28¾″
1	Z	Crown	¾″×3″×34″
2	AA	Crown	¾″×3″×9″
Upper Drawers			
3	BB	Drawer Fronts	¾″×4″×7½″
6	CC	Drawer Sides	¾″×4″×4¾″
2	DD	Drawer Backs	¾″×4½″×6½″
2	EE	Drawer Bottoms	¼″×4″×6½″
2	FF	Door Stiles	¾″×1½″×28¾″
2	GG	Door Rails	¾″×3″×9¾″
2	HH	Door Panels	¾″×10¾″×24½″
2	II	Recessed Bottom	⅜″×17½″×26⅝″

*Includes for tenon

essentially a simple form of the more traditional secretary. The plantation or cupboard desk had a lift-top and was basically a cupboard on a frame. I have opted for this 1810 version: the plantation desk.

Some of these desks were made from hardwood—cherry, maple or walnut—but most were made from pine. Some had glass doors, some panel doors and some no doors at all. A few had a drawer below the writing section, as does ours.

CONSTRUCTION OUTLINE

As simple as most of these desks were, the somewhat challenging construction should be well within the capabilities of most moderately experienced hobbyists. There are one or two tricky areas you should be aware of. The top section has three small drawers set back from the shelves to allow room for the small pulls when the doors are closed. The dividers are made from 1/2 stock, which means you'll need to do either some planing or resawing.

The lift-top of the lower section slants forward at an angle of 10°. This means there are lots of angles to cut, the front legs are shorter than those at the rear and the tops are cut at an angle of 10°, the sides are also angled at 10°, so is the top edge of the front and the rear edge of the lift-top.

The bottom of the desk compartment is made from 3/8″ plywood secured to four cleats, and the drawer runners and guides are secured to two more cleats. These are all fairly simple to install and should be no cause for concern. As the plantation desk was basically a simple, homemade piece, the drawers are constructed using rabbets, glue and cut nails. The 1 1/2" cut-steel masonry nails you can buy at most hardware stores fill this task nicely and look quite authentic. You could, of course,

use blind dovetail construction, but the finished product, while looking much nicer, would not be authentic.

The legs are cut from 8/4 stock and tapered on two adjacent sides to 2°; be sure you make two left and two right, the tapers all facing inward and each other. The sides, front and back are secured to the legs using mortise-and-tenon joints. I used one of the newpolyurethane glues to achieve this. I like the way the glue expands to fill the joint.

The top and lid of the lower section (two pieces—lift section and fixed) is made from 1" furniture-grade pine. You could, of course, use the same good old shelving board from which the rest of the piece is made. The front of the lower section is made from four pieces of stock. The crown is simply made from nominal 1" stock, laid flat and cut just like a raised panel.

BUILDING THE DESK

STEP 1. Cut all the pieces to size, and cut the 3/8"-thick plywood bottom roughly to shape; you can make final adjustments later.

STEP 2. Build the board for the lid.

STEP 3. Using four pieces of stock, build the front of the lower section as laid out in the drawing.

STEP 4. Mill the dadoes in both sides of the top section as laid out in the drawing.

STEP 5. Glue, assemble and toenail the shelves to the sides of the upper section. Clamp, make sure the structure is completely square, then set it aside to fully cure.

STEP 6. Mill the tops of the two front legs—the two short ones—to an angle of 10°.

STEP 7. Cut the two sides of the lower section to shape as laid out in the drawing; the slope is 10°.

STEP 8. Starting 10" from the top of the two rear legs, and 8" from the top of the two front legs, using either your table saw or jointer, taper two adjacent sides of all four legs, making sure you have two left and two right.

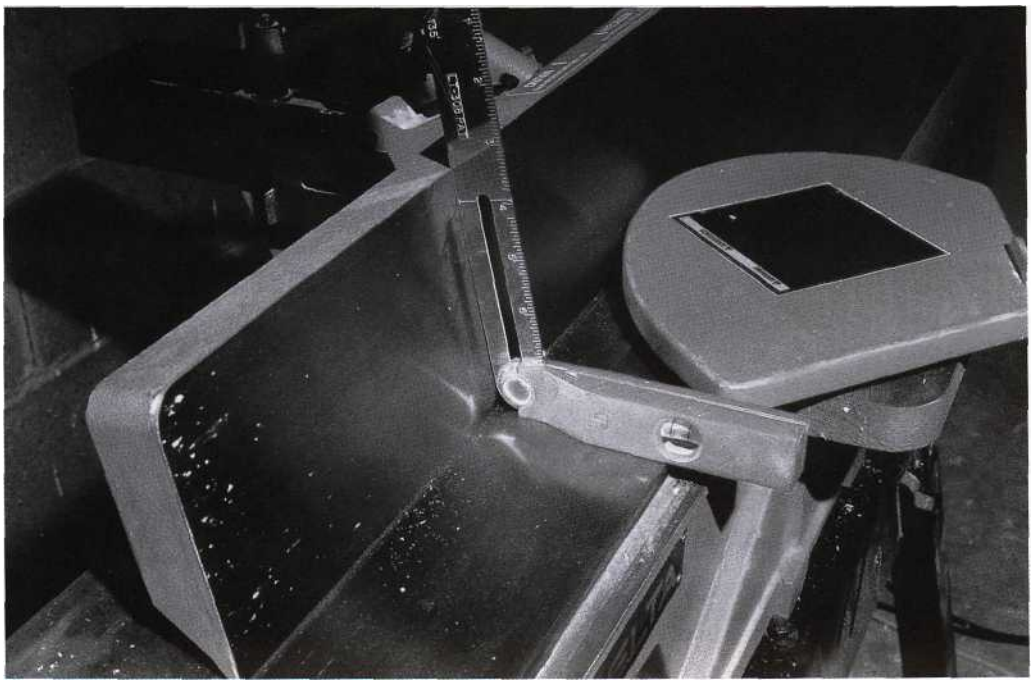
STEP 9. Cut the mortises to the tapered sides of all four legs as laid out in the drawing. **Note:** The mortises that will take the tenons of the front section are different from those that will take the sides and back. Also the 10° slope to the top of the front legs should slant forward—toward you.

STEP IO. Mill the tenons to the front, sides and back of the lower section as laid out in the drawing.

STEP 11. Dry assemble the lower section to ensure you have a good fit. If all is well, disassemble the piece, then glue, reassemble, clamp, ensure the structure is square, 'then set it aside until the glue is fully cured.

STEP 12. Glue and screw the two guide supports to the back and front of the inside of the lower section as laid out in the drawing.

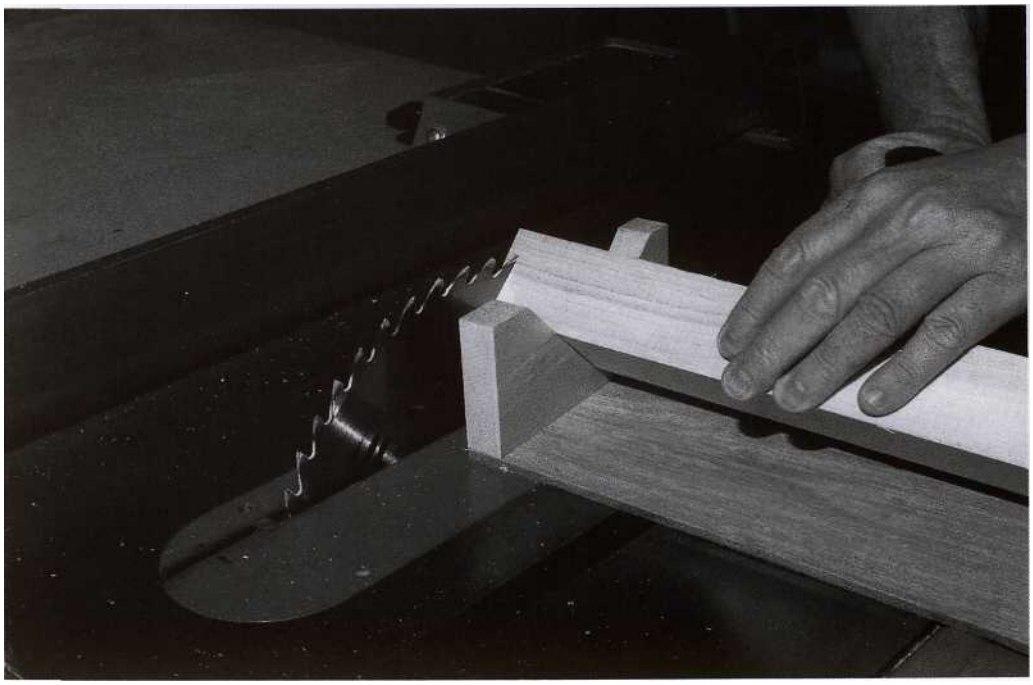
STEP 13. Glue and screw the four cleats that will support the bottom of the desk cavity to the inside of the lower section as laid out in the drawing.



Use a movable square to set the angle to the back fence of your jointer.

When you've set the correct angle, use your jointer to mill the angle to the back edge of the desk lid.

You'll need to build a simple jig to cut the angle to the top of the two front legs.



STEP 14. Build the drawer guides and fit them to the two supports.

STEP 15. Make any final adjustments to the 3/8" plywood cavity bottom, then using small brass screws, fasten it in place on the four cleats above the drawer cavity.

STEP 16. Take both sections of the lid to the router and round over the two ends of the rear section and both ends and front of the lift section.

STEP 17. Take the lid to the jointer or table saw and mill the back edge to an angle of 10° so that it will fit nicely against the rear section.

STEP 18. Mark out and cut mortises for 1 1/4 brass butt hinges to both sections as laid out in the drawing.

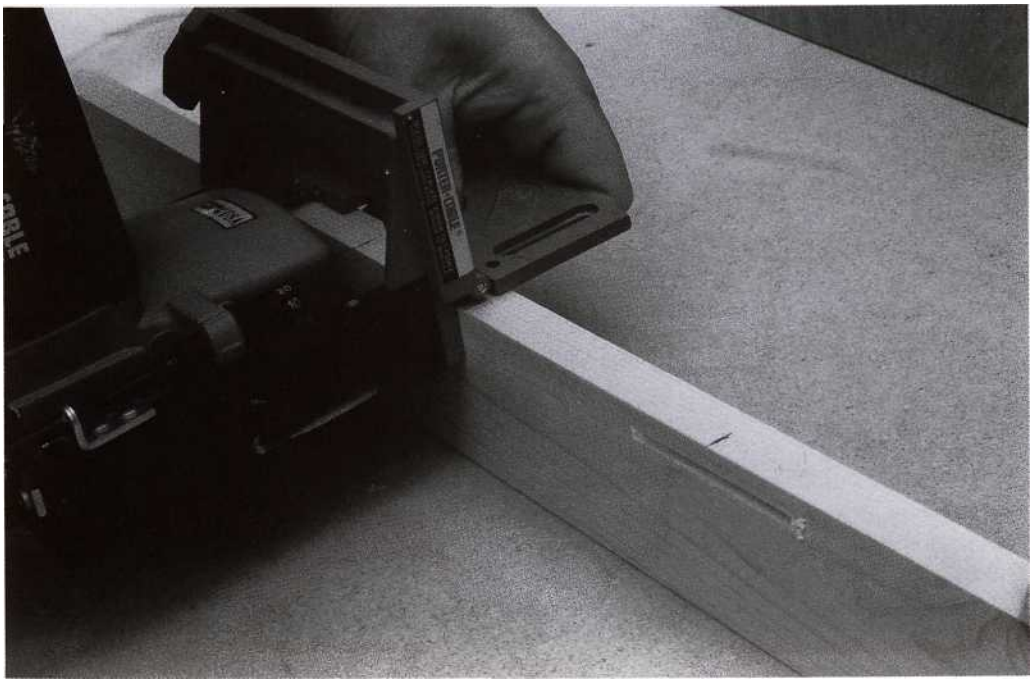
STEP 19. Using two 1¼" brass butt hinges, assemble the two sections of the lid together.

STEP 20. Carefully set the assembled lid section in place on top of the desk, then glue and screw the rear section of the lid in place on the flat area at the rear.

STEP 21. Returning to the upper section, lay it flat on the

To work your door panels, set the table saw blade to cut at an angle between 15° and 17°. The blade should just break through the surface, leaving a nice, clean step that will define the panel.

Attach the trim to the upper section with biscuits. Mark the side of the cupboard section and the edge of the trim, and then carefully mill the slots.



bench, put the trim in place and mark for biscuit slots. If you don't use biscuits you can glue, clamp and nail the pieces in place.

STEP 22. Remove the trim and mill the biscuit slots.

STEP 23. Glue and clamp the trim in place. If you've used nails, now's the time to set the heads and fill the holes.

STEP 24. Glue and clamp the two small fillers in place between the trim and drawer section as you see in the drawing and photo above (bottom).

STEP 25. Take the three pieces that will make up the crown to the table saw, which should be set to cut at an angle of 17°. Place the stock on edge and mill the crown just as you would if you were making a raised-panel door (see top photo above).

STEP 26. Cut the three sections of the crown to their final dimensions, then miter the ends to 45°.

STEP 27. Glue and screw the crown in place to the top of the cupboard section. Glue the miters together.

Try this setup to make milling the mortises for the hinges easier. The extra support provided by the top board will enable you to mill an accurate mortise.

STEP 28. Build the two doors as laid out in the drawing and the Shop Tip on page 91.

STEP 29. Mark the doors and opening for 1 1/4″ brass butt hinges as laid out in the drawing, but do not fit them
yet.

STEP 30. Set the cupboard section carefully in place on the rear flat section of the desk and carefully secure them together using no. 8 X 1 3/4" screws. If you've used 3/4″ stock for the lid you need to use 1 1/2 screws.

STEP 31. Build the three small drawers for the cupboard section as laid out in the drawing.

STEP 32. Build the drawer for the desk section as laid out in the drawing.

STEP 33. Finish sand all the completed sections and drawers.

STEP 34. Apply a coat of stain to all sections of the desk and drawers.

STEP 35. After finishing is complete you can attach the knobs to the doors and drawers and fit the doors to the cupboard section.

FINISHING

I kept things very simple for this piece. After doing a little light distressing and applying a medium stain, I applied eight coats of seedlac mixed to a three-pound cut. This gave the piece a deep, almost dark golden shine. The final step was to apply a couple of coats of beeswax—ummmm, nice.

SHOP TIP

Building a Raised Panel Door

Today, most people use a router table and an expensive set of bits to mill the pieces for a raised panel door. True, you can mill some pretty edges, as well as curved tops and the like, but to me, the expense is not worth the result. The heavy bits require a three-horse router or a shaper, the bits cost a fortune and the method requires more time than I have available. I prefer, instead, the old-fashioned look: square door frames and flat, beveled panels. They are quick and simple to make, especially with a little practice. I can make a set of four doors, complete, in a only a couple of hours. The way I do it is somewhat controversial, but it works for me. The method is as follows:

1. Begin by cutting your rails and stiles exactly to length.

2. Use either your router with a 5/16" straight-cutting bit or your table saw to mill 3/8"-deep grooves to the inner edges of the rails. The cut runs the entire length of the rails, and stops 2¾" short from both ends of the stiles. I use my router table with the stops marked on a piece of masking tape that shows just above the stock.

3. Once you've cut the slots, lay out the rails and stiles and mark for biscuit slots. You can use lap joints if you like, but you'll need to adjust the length of the rails to maintain the outer dimensions of the doors.

4. Mill the biscuit slots.

5. Dry fit the rails and stiles and measure the width and height between the grooves to get the true size of the panels.

6. Sand the rails and stiles smooth and stain the inner edges. It's much easier to stain them before than after assembly.

7. Glue and clamp the rails and stiles, *one side only*, dry fit the other, ensure all is square, then set them aside until the glue is fully cured.

8. If necessary, build the boards that will make the panels and trim them to size.

9. Set your table saw to cut at an angle of 17°, and the rip fence at 1/4" and mill the bevels to the edges of the panels. The tip of the blade should just break through the surface of the stock, leaving a small step and nice clean lines.

10. Sand the panels smooth, paying close attention to the bevels, and then apply the stain.

11. When the glue is fully cured, remove the clamps from the frames, and remove the dry-fitted stiles.

12. Slide the panels into place in the now open frames, glue and clamp the remaining stiles in place, and set the completed doors aside to allow the glue to fully cure.

13. Either round-over or break the outer edges.

14. Do any necessary sanding to the joints, then the finish sanding and, finally, complete the staining.

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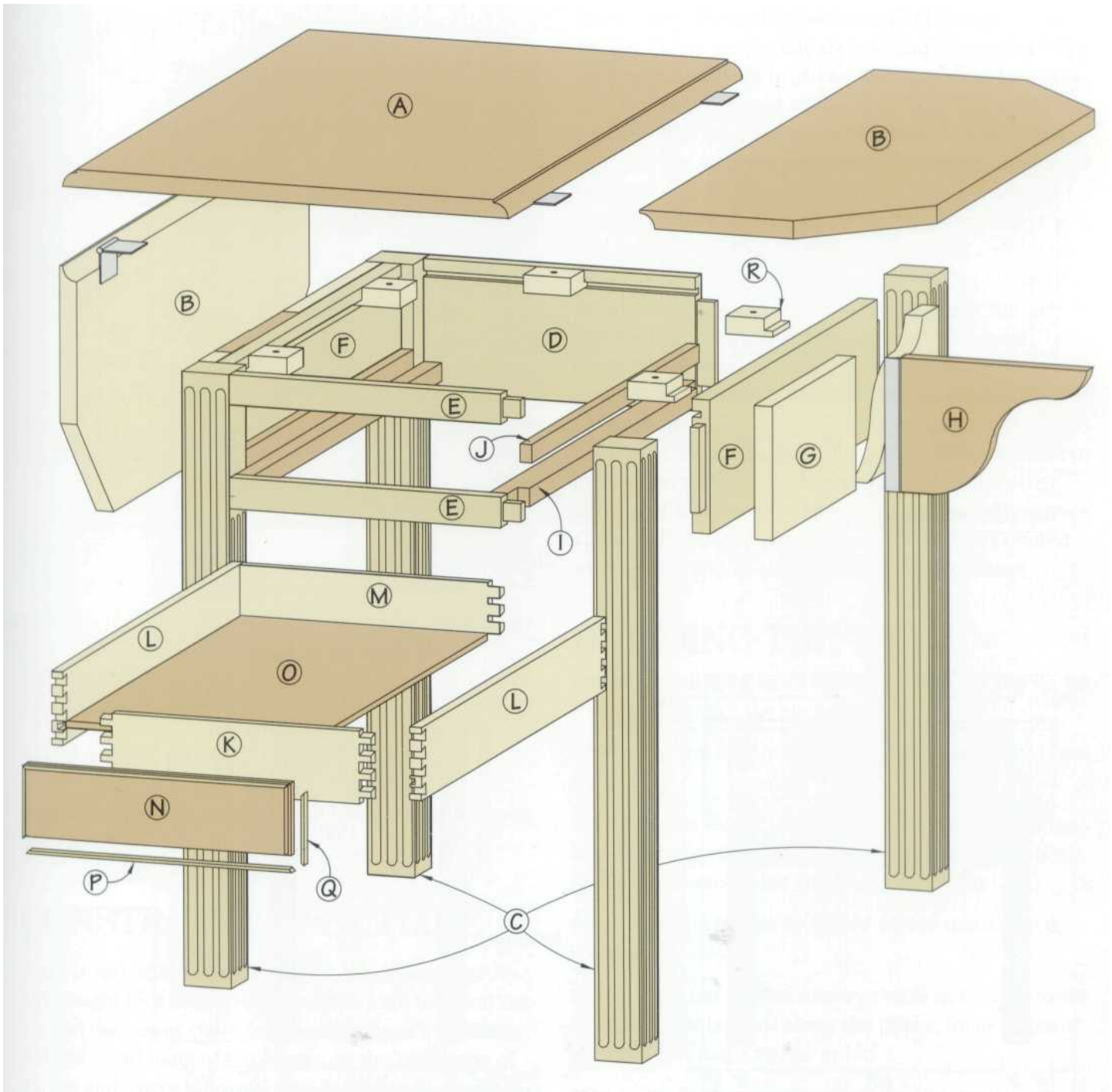
Eighteenth-Century Pembroke Table

Aesthetically pleasing and a nice piece to have around the home, the Pembroke table has become something of a classic since its introduction during the second half of the eighteenth century. The first was designed by Thomas Chippendale for Lady Pembroke, hence the name. Thomas Sheraton also made a variation, but his had a serpentine top and slender, turned, reeded legs and was missing the classic lower stretchers. Ours follows Chippendale's basic design. The top is supported by square, fluted legs. On some of his designs the legs were braced by a saltire—an X-shaped stretcher—sometimes arched; ours is not.



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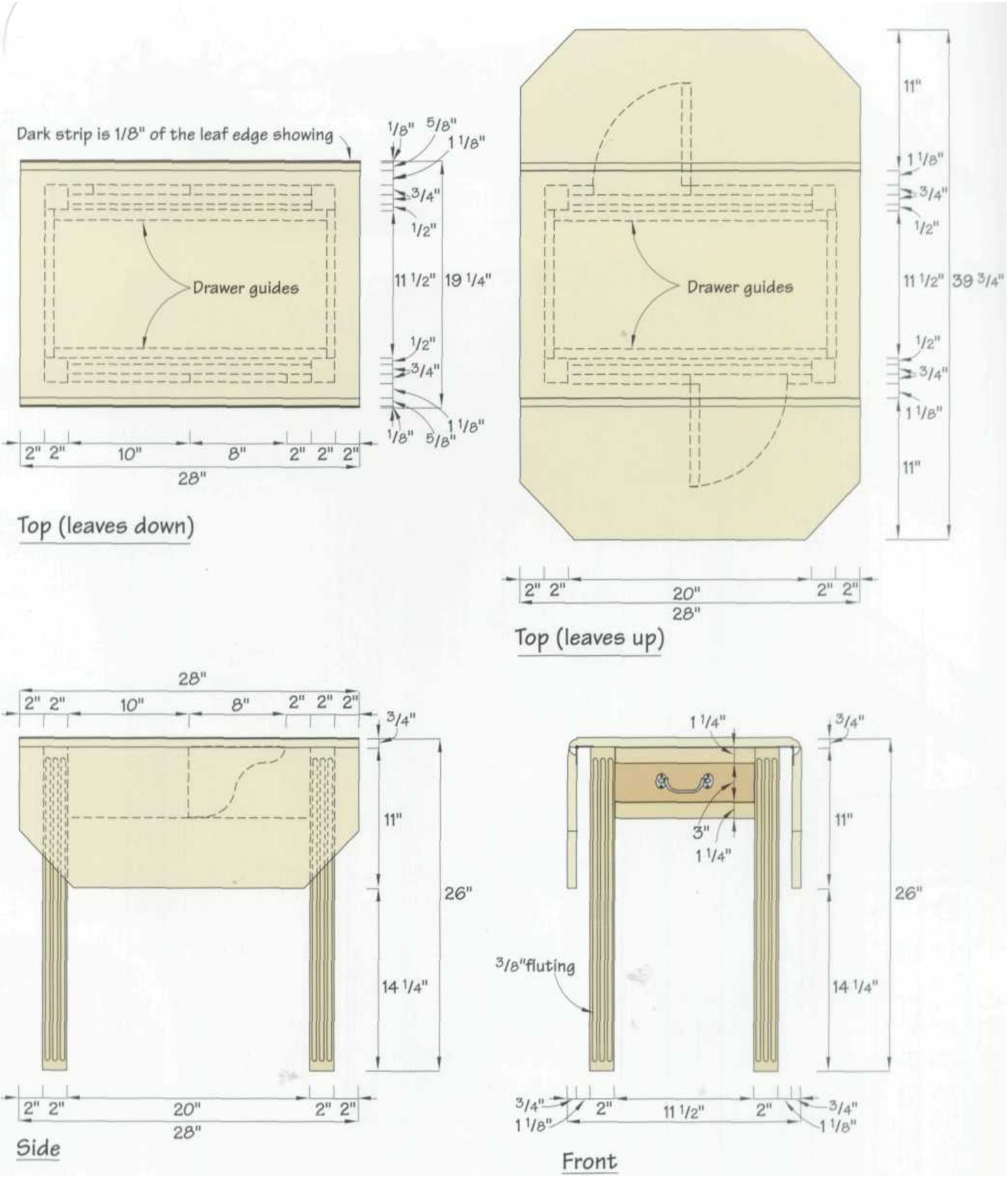

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MATERIALS LIST

Pembroke Table Bill of Materials

No.	*Letter*	*Item*	*Dimensions T W L*
1	A	Top	¾″×19″×28″
2	B	Drop Leaves	¾″×11″×28″
4	C	Legs	2″×2″×4½″
1	D	*Short Apron	¾″×5½″×13″
2	E	*Rails	¾″×1¼″×13″
2	F	*Long Aprons	¾″×5½″×21½″
2	G	Fillers (long)	¾″×5½″×10″
2	H	Fillers (with wings)	¾″×5½″×10″
2	I	Drawer guides	¾″×1¼″×22½″
2	J	Drawer guides	½″×½″×20″
1	K	Drawer front	½″×3″×11½″
2	L	Sides	½″×3″×22″
1	M	Backs	½″×2½″×11½″
1	N	False Fronts	¾″×4¾″×12″
1	O	Bottoms	¼″×11″×21¾″
2	P	Beading	⅛″×⅜″×11½″
2	Q	Beading	⅛″×⅜″×3″
5	R	Top Cleats	¾″×2″×2″

*Includes Tenons

CONSTRUCTION OUTLINE

Basic construction is quite simple, but a couple of features might be little tricky. The rule joint between the top and the leaves could pose something of a challenge, and the positioning of the hinges on the underside of the top and leaves is critical (see detail on the drawing). The rule joint is cut at the router table. Two bits are used: a 1/2″ roundover bit for the convex cuts along the edges of the top, and a *V″* cove for the concave cuts along the edges of the leaves. Make each cut deep enough to provide a 3/16" shoulder. You'll need to make several passes to complete each cut, and take care to ensure the depth of the two cuts is exactly the same and that both leaves and top marry together properly (see photo). The legs are cut from a piece of 2"X 12" stock. The flutes are cut with a 3/8″ V-groove bit (a round nose would work just as well) in the router table. The apron and legs are joined together with mortise-and-tenon joints. Watch the positioning of the side rails; they are inset to accommodate the pad and leaf support. The front rails are made from two separate pieces of stock, mortised and tenoned to the front legs. The leaves are supported by pivoted, shaped brackets. The brackets/supports are part of a pad glued to the outer face of the two side rails. The supports themselves are attached with short sections of piano hinge, mortised into the end grain of the flap. The drawer runners and guides are glued and screwed in place. The construction of the drawer itself is quite conventional, utilizing through dovetails at the front and butt joints at the back. The drawer front has beaded edges and is glued and screwed to the front of the drawer body. The tabletop is attached to the frame with buttons. The hardware is authentic to the period. As to the finish, most Pembroke tables were made from mahogany, cherry, maple or some other hardwood, but some did have softwood tops. They were all finely finished. Ours has been stained and treated with shellac and beeswax buffed to a high shine.

BUILDING THE TABLE

STEP 1. Cut all the pieces to size, glue up the pieces for the top and make the six buttons.

STEP 2. Cut the mortises into the legs, two left and two right.

STEP 3. At the router table, cut 1/4″ deep flutes into the legs—eight on each leg, two on each face—each equidistant from each edge and from each other.

STEP 4. Cut the tenons to all five pieces that make up the apron.

STEP 5. Using either your router or table saw, cut grooves to receive the buttons along the upper, inner edges of the rails that make up the apron.

STEP 6. Dry fit the apron to the legs.

STEP 7. Sand the legs and apron and set them aside for assembly later.

STEP 8. Cut the brackets from the two pieces designated for the pads and sand all of the resulting six pieces.

STEP 9. Cut the finger pulls to the curved section of each pad (see photo and drawing detail).

STEP 10. From a section of piano hinge, cut two pieces 4 1/2' long. You may have to drill extra screw holes.

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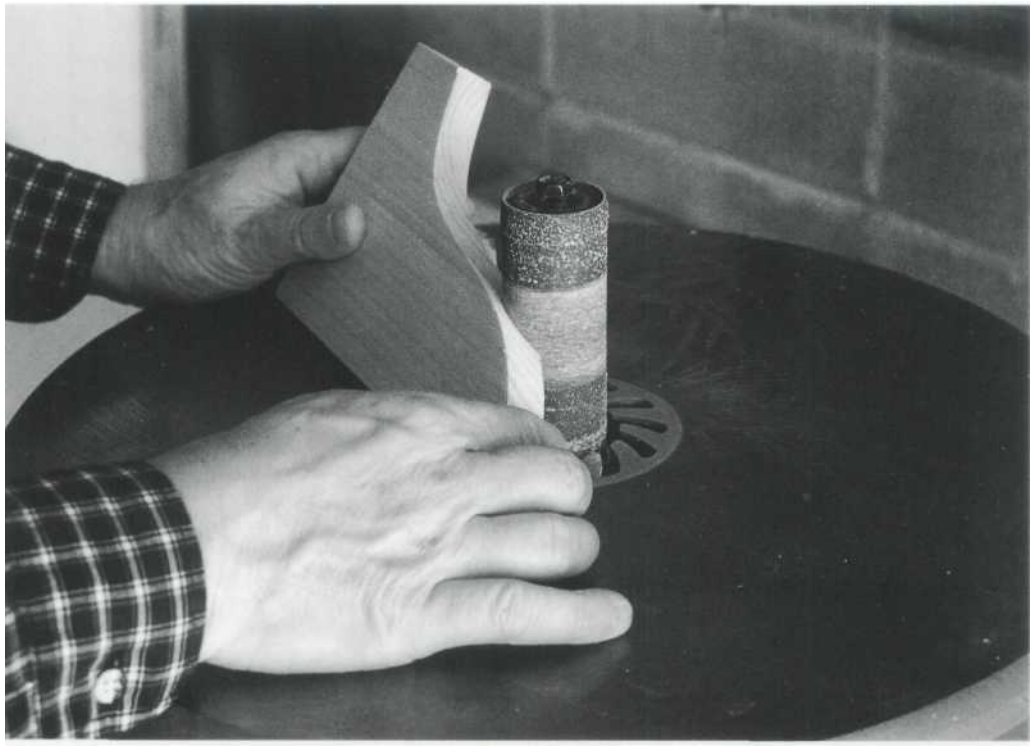
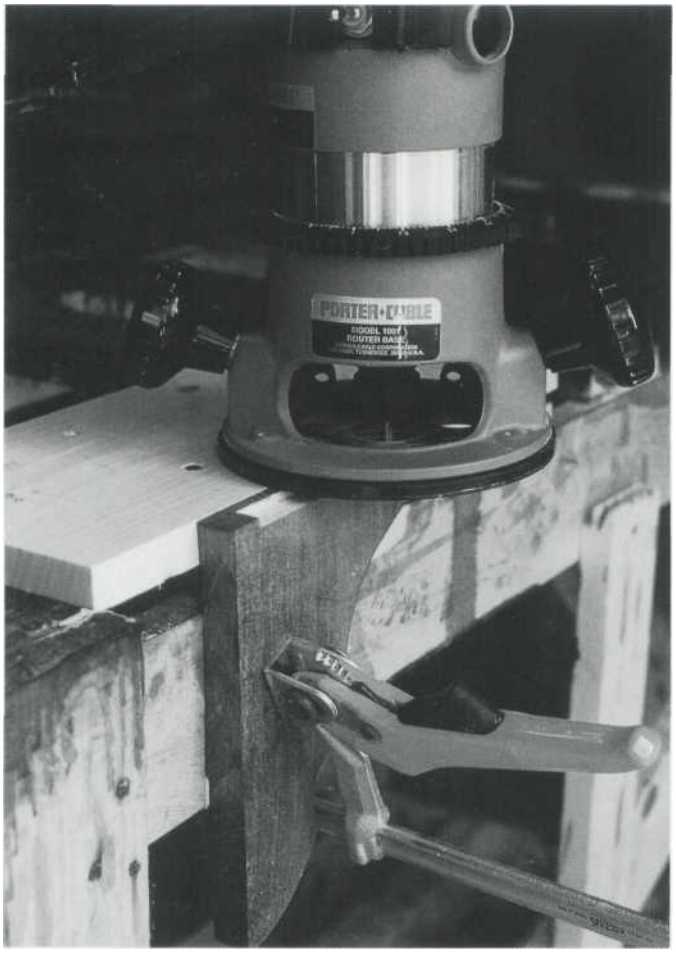


Use your spindle sander, or a drum sander in your drill press, to cut the finger pulls in the pad and leaf support brackets. Simply hold each piece at an angle and push gently.



Try this **setup** for mortising the end grain of the leaf support **brackets.**

STEP 11. Cut mortises to receive the hinges in the ends of the brackets. Make sure you have a left- and right-hand (see the setup illustrated in photo).

STEP 12. Attach the hinges to the brackets.

STEP 13. Dry fit the pads and brackets over one of the side rails. Lay all three pieces of one set in line on top of the rail and make sure there's room enough for the bracket to pivot without fouling the outer edge of the pad. You may have to trim the end of the pad slightly and round over the inner edge of the bracket. Do the same with the second set, then set everything aside for assembly later.

STEP 14. Glue, assemble and clamp the legs and apron, and set the structure aside to cure overnight.

STEP 15. Glue and screw the pads to the outer faces of the two sides.

STEP 16. Glue and screw the drawer runners and guides to the inner face of the apron.

STEP 17. Attach the brackets to the pads. The frame is now complete.

STEP 18. Cut the angled corners to the two leaves.

STEP 19. At the router table, using a 1/2" roundover bit and 1/2" cover bit, cut the rule joints to the long edges of the top and the two leaves.

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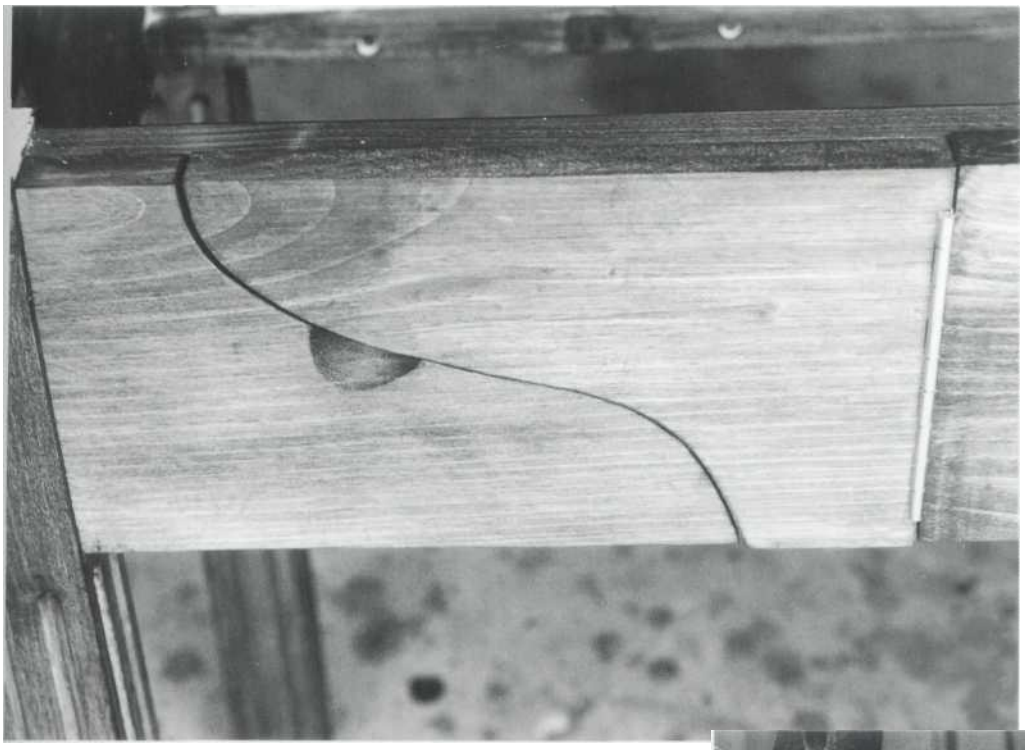


This is how the pad and leaf support bracket should look after assembly; note the position of the finger pull.

STEP 20. Cut the beaded edges to the front and back of the top and the outer edges of the leaves.

STEP 21. Mark out the position of the hinges to the undersides of the top and leaves. Be sure to position them exactly as laid out. in the detail drawing; if you don't, the leaves will either foul the top or you'll have an unsightly gap between the two. There's no need to mortise the hinges.

STEP 22. Sand the top and leaves smooth, paying particular attention to the rules and beads. Do not assemble the top and leaves together yet.

STEP 23. Cut the through dovetails to the three pieces that make up the front of the drawer.

STEP 24. To the same three pieces, cut 1/4-wide grooves to receive the bottom, and make sure these do not foul the dovetails.

STEP 25. Assemble the drawer—butt joint the back with glue and brads.

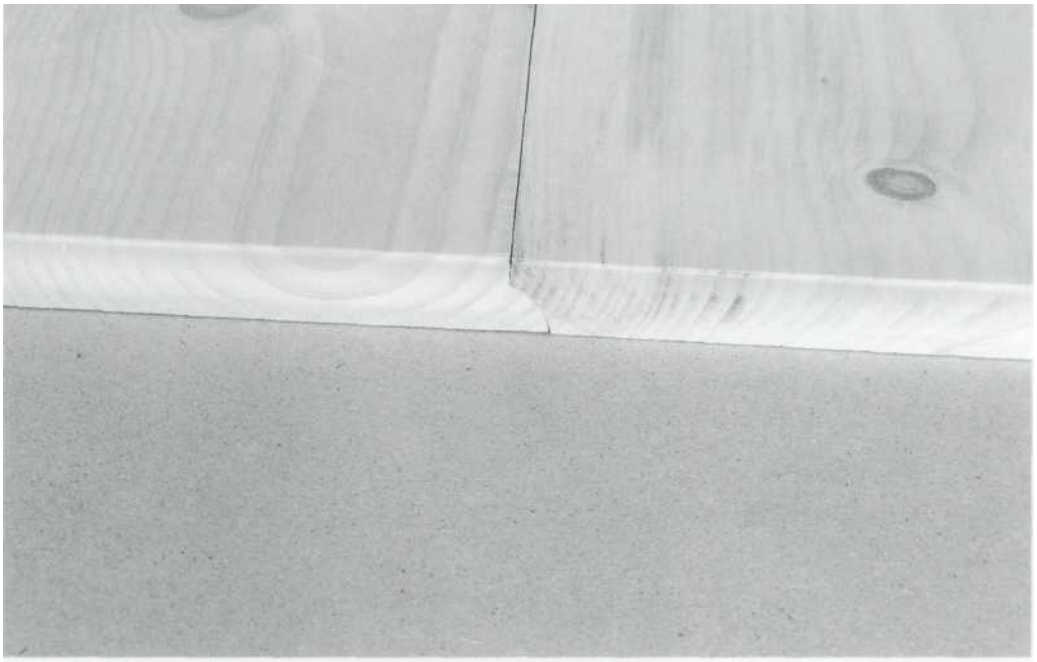
STEP 26. Cut the beads to the edges of the drawer front.

STEP 27. Sand the drawer front smooth and then glue and screw it, to the front of the drawer. Do not attach the hardware yet. You are now ready to begin the finishing process.

Use a 1/2" cove bit in your router table to cut inner lower edge of the leaf.

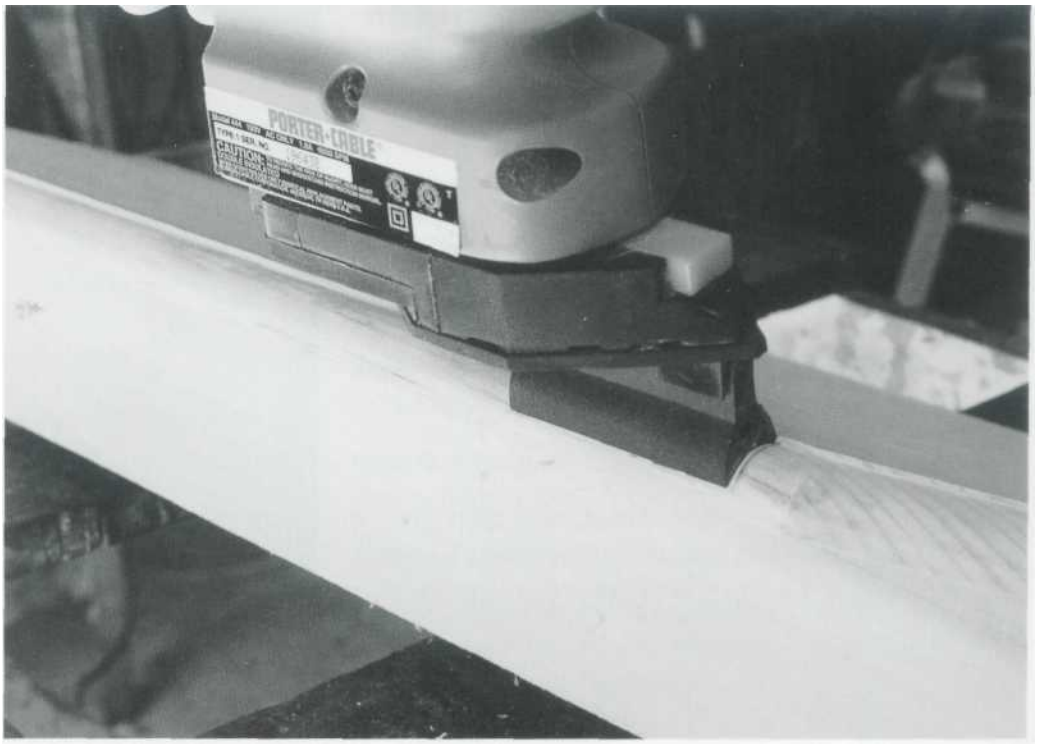
FINISHING

First you should do a little light distressing—just a small ding or two—then some final sanding before staining the pieces. I used Jacobean by Minwax. It's darker than Provincial. Now apply a sealer coat. I used shellac—seedlac at a one-pound cut left overnight to fully cure. Next., lightly sand the grain and apply four more coats of seedlac at a three-pound cut, leaving each to fully cure overnigh., and rub the surface smooth—0000 steel wool is best for this and gets right into the corners of the flutes. This will give the piece a rich, dark luster. You could, of course, finish the piece with a couple of coats of polyurethane, but the look will be something less than authentic. Next, assemble the leaves to the top. Do this on the bench on a folded blanket so as not to scratch the finished surfaces. Now assemble the top to the frame. Finally, finish it all off with a couple of coats of beeswax buffed to a shine, and attach the pull to the front of the drawer.



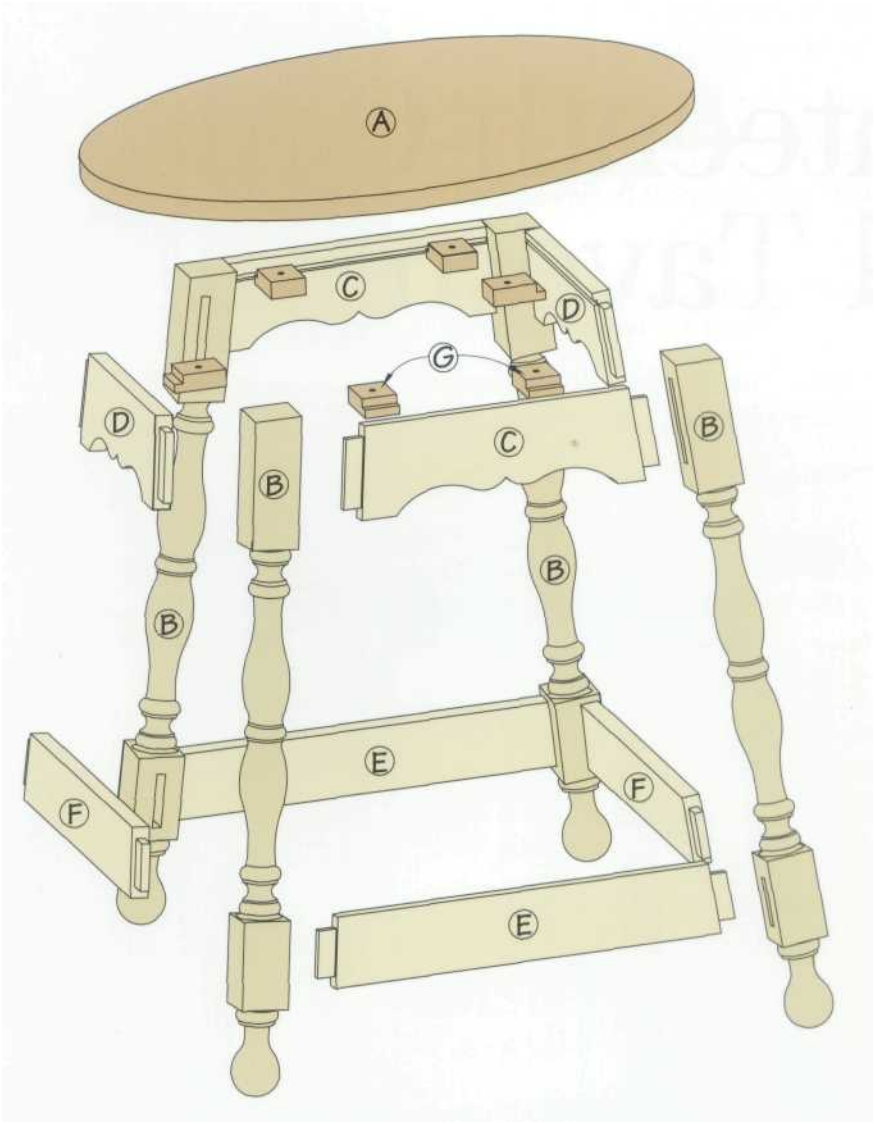
The leaves and the tabletop should marry exactly.

Sand all the profiles smooth before staining.



Eighteenth-Century Oval Tavern Table

One of the most important institutions, both in Europe and Colonial America, was the inn or tavern. It was, and in Europe still is, the social center of the community. But it was more than just a gathering place. It was the place to get up-to-date news, where politics were discussed and town meetings were held. It was also the scene of hard drinking and rowdiness, and the furniture therein was built to withstand



SHOP TIP

Marking an Oval

On your 27″ × 25″ plywood, mark a line down the center of the length. Mark the middle of the center line, then measure out 6¼″ to either side and mark both spots. Drive a small screw partway into each of the two spots, leaving the head proud by about ⅛″. Now take a piece of thin string, double it in two and make a loop 19¼″ in diameter; it doesn't need to be exact, ⅛″ either way won't matter. Next take a pencil, lay the string around the two screws as you see in photo on page 36, place the pencil inside the loop and draw the string tight. Now, keeping the string tight, push the pencil around the oval, which should finish roughly 26″ × 23″. Finally, cut the oval from the rectangle, adhering closely to the line, and sand the edge smooth and true.

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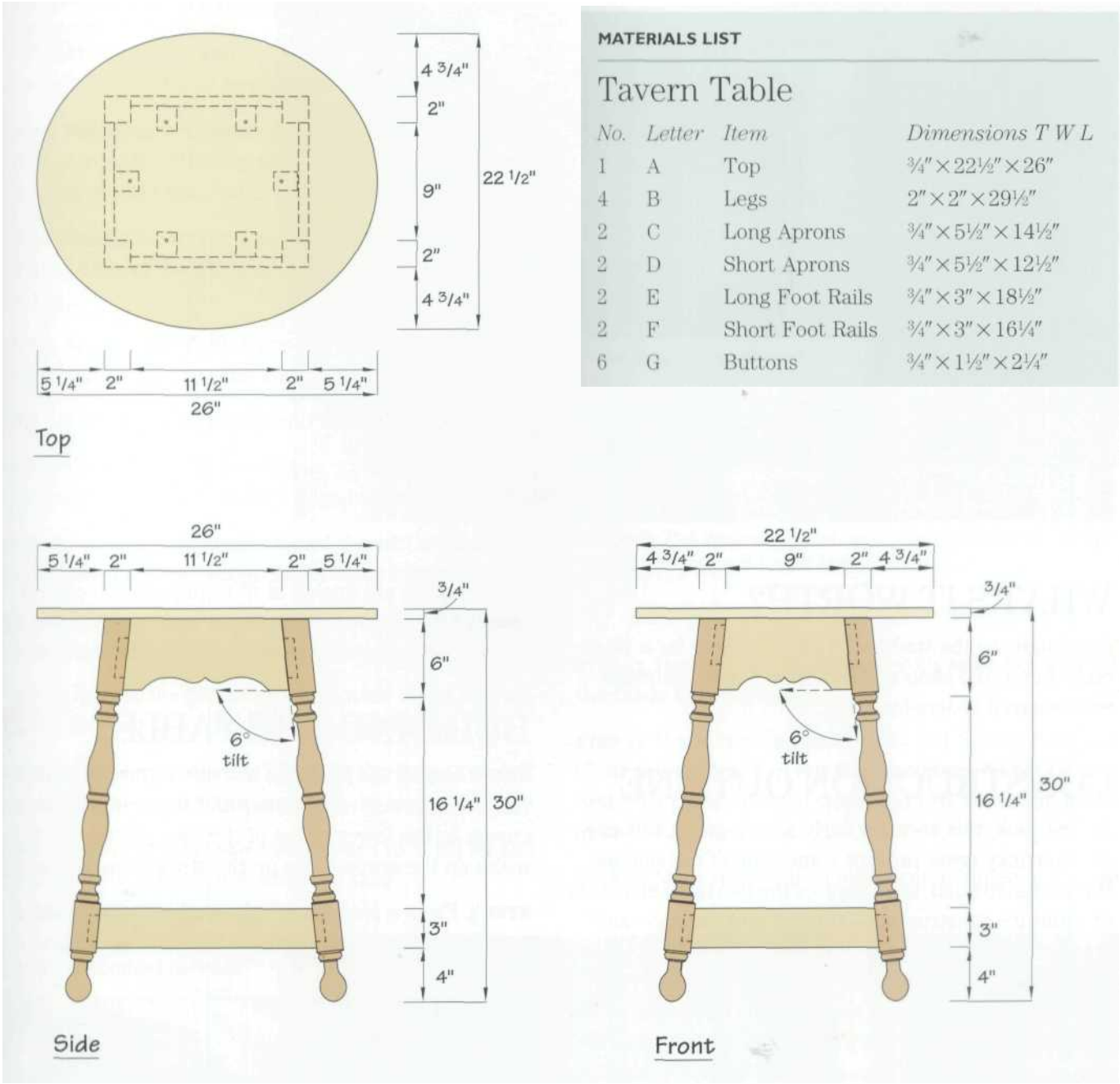

MATERIALS LIST

Tavern Table

No.	*Letter*	*Item*	*Dimensions T W L*
1	A	Top	¾″×22½″×26″
4	B	Legs	2″×2″×29½″
2	C	Long Aprons	¾″×5½″×14½″
2	D	Short Aprons	¾″×5½″×12½″
2	E	Long Foot Rails	¾″×3″×18½″
2	F	Short Foot Rails	¾″×3″×16¼″
6	G	Buttons	¾″×1½″×2¼″

inevitable abuse. So, tavern tables, in one form or another, have been around for centuries, but were at their most popular during the eighteenth and nineteenth centuries. Typically they had square, rectangular, round, octagonal or, in rare cases, oval tops, and three or four tapered, square or turned, splayed legs. (It seems square legs didn't appear until after 1790, before that they were all turned.) Antique oval tables were and are quite rare. This one is typical of those made in New England from 1700 until 1820. The turned legs are typical of the late Jacobean-early Queen Anne period. It's an elegant piece, unusual and will definitely be a nice addition to your home.

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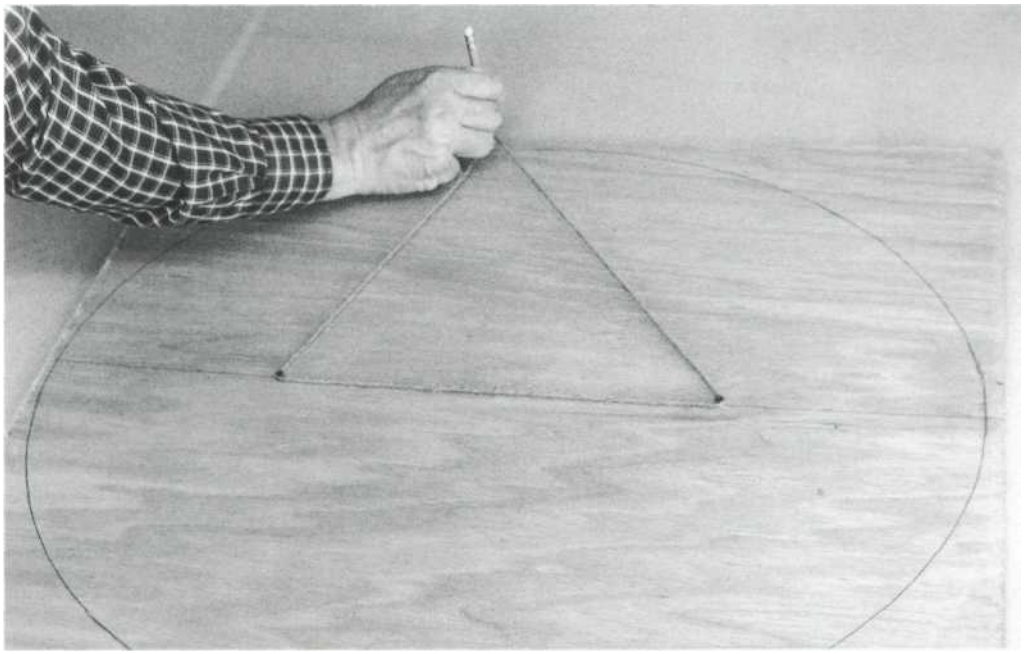


This setup will provide the oval shape for the tabletop.

CONSTRUCTION OUTLINE

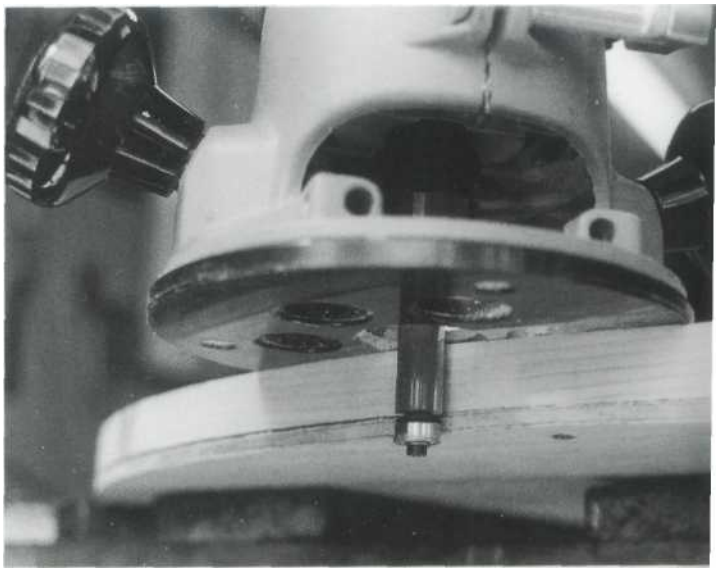
At first look, this seems a fairly simple piece, but one or two tricky areas present something of a challenge**.** But it's fun to build, incorporates the two basic elements of furniture construction—turning and joinery—and you get to use almost every tool in the shop.

The legs, apron and rails are joined together with mortise and tenon joints, and the top is attached to the base with six buttons, but you can use cleats and screws or pockets if you like. The board for the top is constructed using three pieces of stock eight inches wide with the grain alternated for stability. The legs are turned from blanks cut from 2" X 12" stock. If you don't have a lathe, you can substitute tapered square legs. I cut the mortises in the legs using a dedicated hollow chisel machine; you can use hand tools. If you use a mortise machine or an attachment for your drill press, you **may** find that cutting mortises for left- and right-hand legs can be a little confusing. I use a piece of scrap stock, screwed to the bed on my machine, and mark the stop and start positions on it; you might like to do the same (see photo). The compound angles at the top of the legs and apron take a little figuring out, but you'll find instructions below. The ends of the rails that make up the apron are angled at 6° to provide the correct splay of the legs, and the tenons have to be angled upward at an angle of 6° to fit the mortises (see photo).

BUILDING THE TABLE

STEP 1. Cut all the pieces as laid out in the materials list, run them through the jointer and then cut the cyma curves to the lower edges of the four pieces that will make up the apron. Glue up the stock to make the top.

STEP 2. From a piece of 1/4" plywood 27" X 25" make a pattern for the top—see Shop Tip.



Use your plywood pattern and a 1/2 flush trimming bit in your router to true the edge of the tabletop.

STEP 3. Use the pattern to mark an oval on the underside **of the** lop.

STEP 4. Cut the oval 1/8″ larger than the mark.

STEP 5. Use small screws to attach the plywood pattern to the underside of the top, making sure excess material **shows** all around the oval.

STEP 6. Take your router and a flush trimming bit and trim the edge of the top true. Remove the pattern from the top.

STEP 7. Replace the flush trimming bit with a 3/4″ round-over bit and round the top edge of the top.

STEP 8. Sand the top smooth and set it aside.

STEP 9. Take one of the leg blanks, mark the top and lower square sections and set it into your lathe.

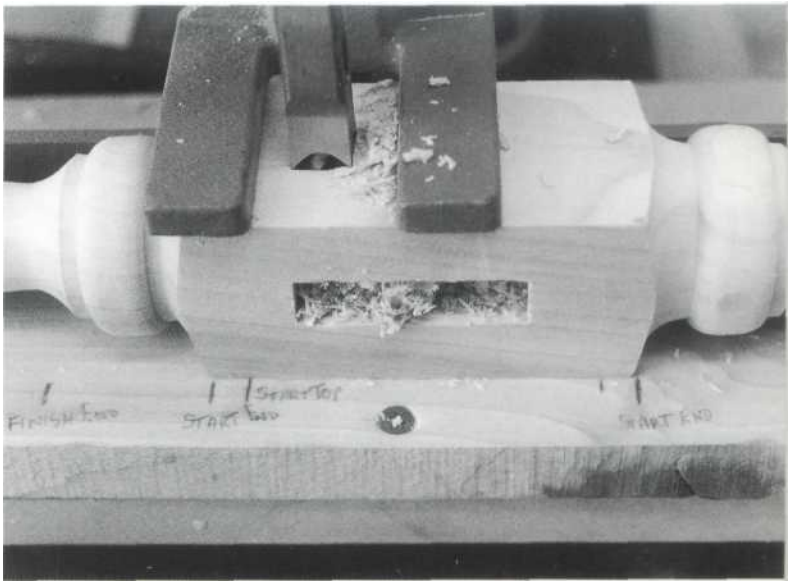
STEP 10. Using a large gouge, round the section between **the** squares and the section beyond the lower square.

STEP 11. Mark for the beads, coves and ball foot as laid out in the drawing, turn to size and sand smooth.

STEP 12. Repeat the process for the other three legs using **the** first leg as a reference and marking aid.

STEP 13. Cut the mortises 3/4″ deep in the legs—two left **and** two right—as per the drawing.

STEP 14. Set your table saw miter gauge to 6° off 90 and trim the ends of the apron and foot rails.



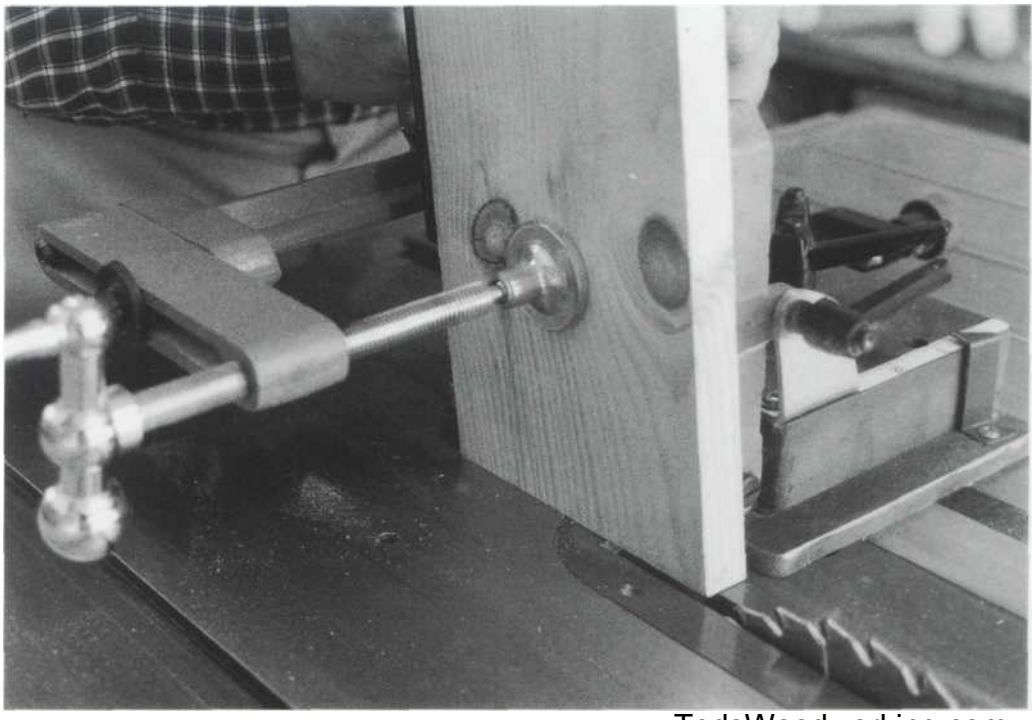
Attach a piece of scrap stock to the bed of your mortise machine or drill press, and mark the left- and right-hand start and finish positions. This ensures accurate positioning and makes it simple to work left- and right-hand legs.

STEP 15. Remove the guard from your table saw and set the blade to a depth of 3/4".

STEP 16. If you have a tenoning jig, set the back-stop to 6° off the vertical and cut the shoulders. **Note: D**o this first on a piece of scrap stock and test the tenon for fit in one of the mortises.

STEP 17. Mark the small shoulders at an angle of 6° (see

After cutting the rails to length and trimming the ends to an angle of 6°, set the back-stop on your tenoning jig to 6° and cut the tenons.



the photo) to accommodate the angle inside the mortise.

STEP 18. Use your band saw to cut the small shoulders.

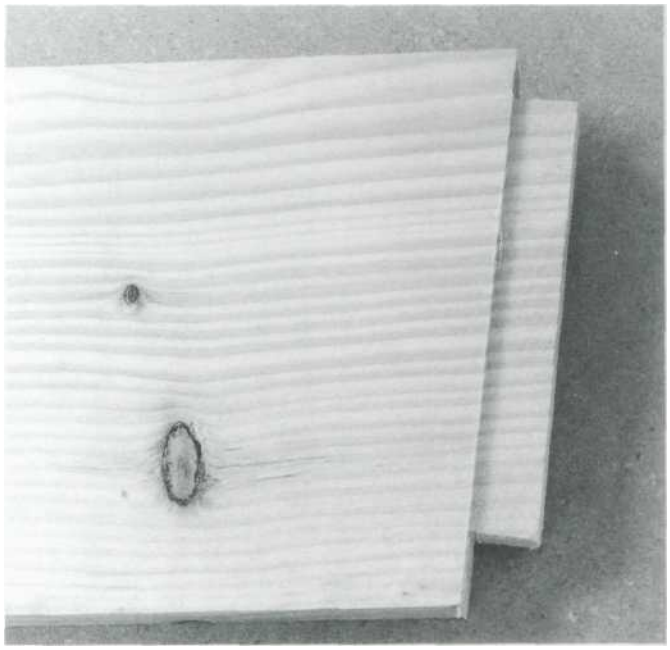
STEP 19. Replace the guard on your table saw and tilt the blade to 6°.

STEP 20. Set **your** rip fence to 5 ½", lay the rails flat on **the** table, outer side up and top edge toward the blade, and trim the edge to 6° so that top of the understructure will fit flush to the underside of the top. Mark the outer top corner of each leg as you see in the photo at right.

STEP 21. Make a small jig (see photo below), return the table saw blade to 90°, set your miter gauge to 6° off 90 and, using the jig, trim the top of each leg. This is also so the top of the understructure will fit flush to the **underside** of the top.

STEP 22. Dry fit all the rails to the legs and lay the top on the structure; all should sit true.

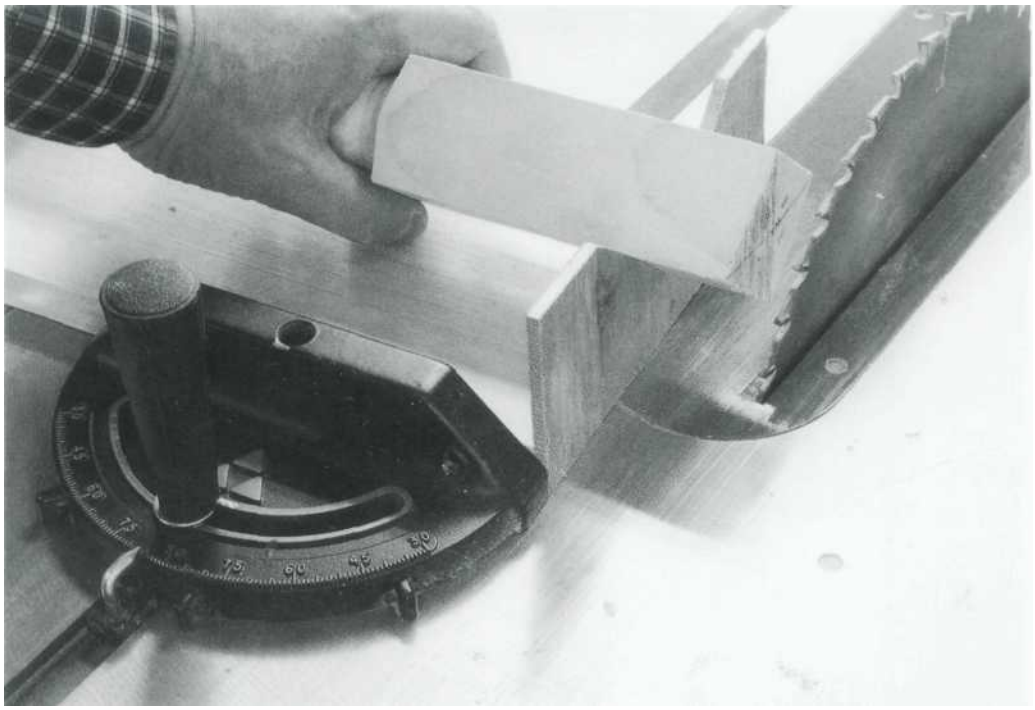
STEP 23. Disassemble all the pieces, sand everything smooth, glue, reassemble the understructure, clamp and leave overnight to cure, but do not attach the top yet.



You'll need to cut the shoulders of the tenons to angle upward at 6° so they'll fit the mortises properly.

FINISHING

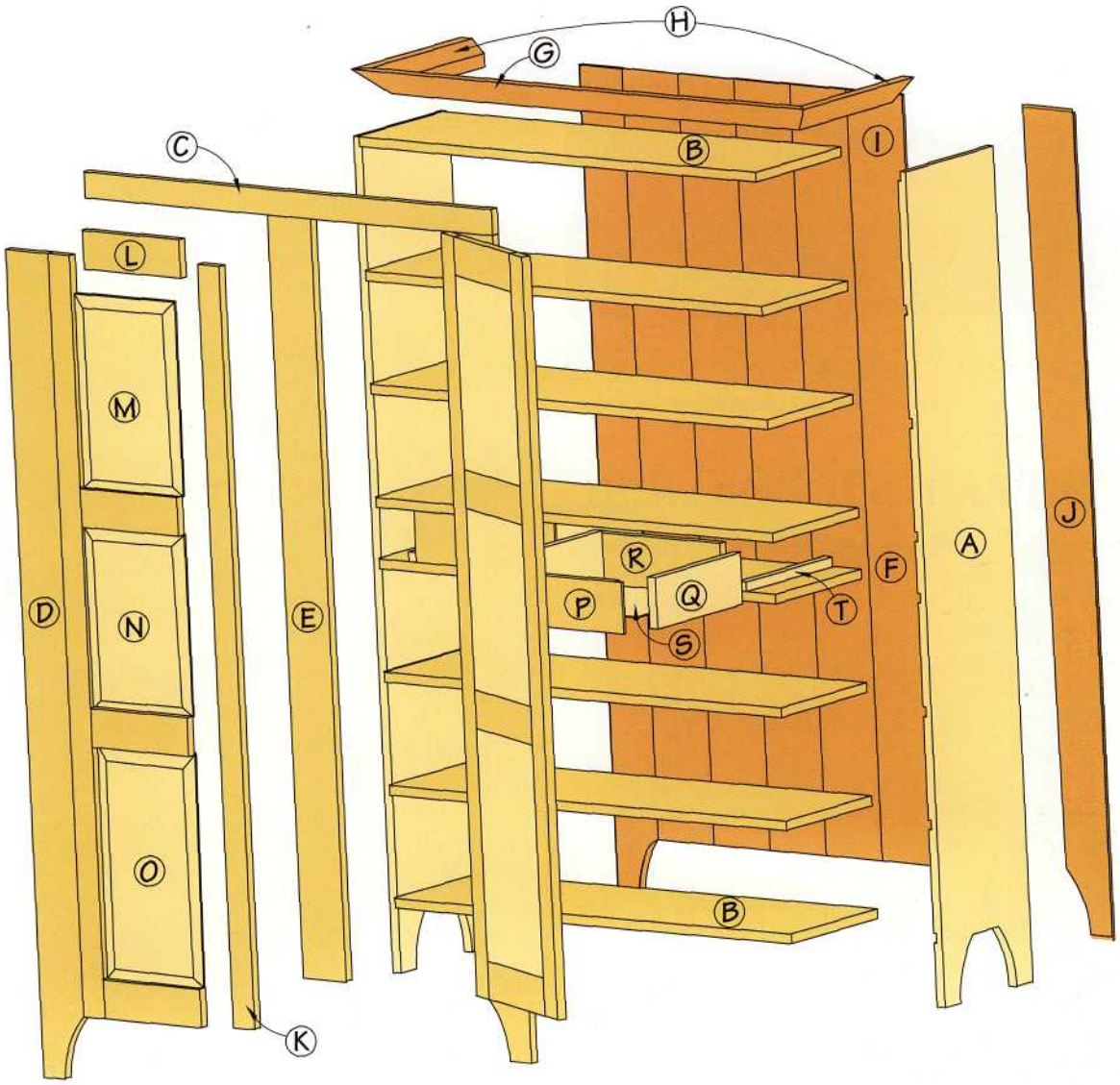
1 did **a** little light distressing—just a small ding or two—before staining the pieces with Provincial by Minwax. Then I applied a sealer coat of shellac—seedlac at a one-pound cut—and left it overnight to fully cure. Next, I lightly sanded the grain and applied four more coats of seedlac at a three-pound cut and rubbed the surface smooth with 0000 steel wool (see "Finishing," chapter three). This gave the piece a rich, dark **luster.** Next, I assembled the top to the understructure and finished the whole thing off with a couple of coats of beeswax buffed to a shine.



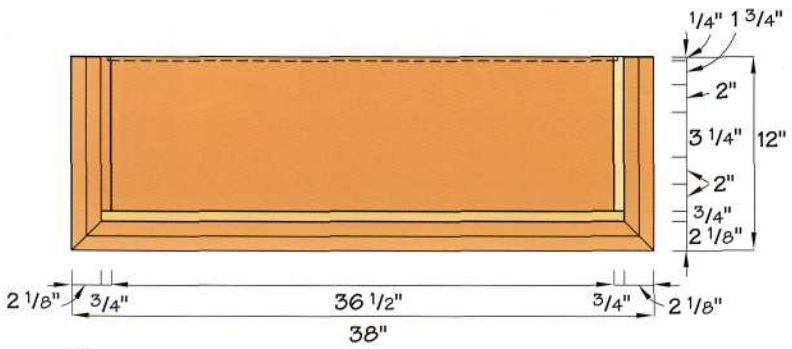
Make this simple jig to trim the tops of legs to an angle of 6°; note that the blade is vertical and that the miter gauge is set at 6°

New England Pantry

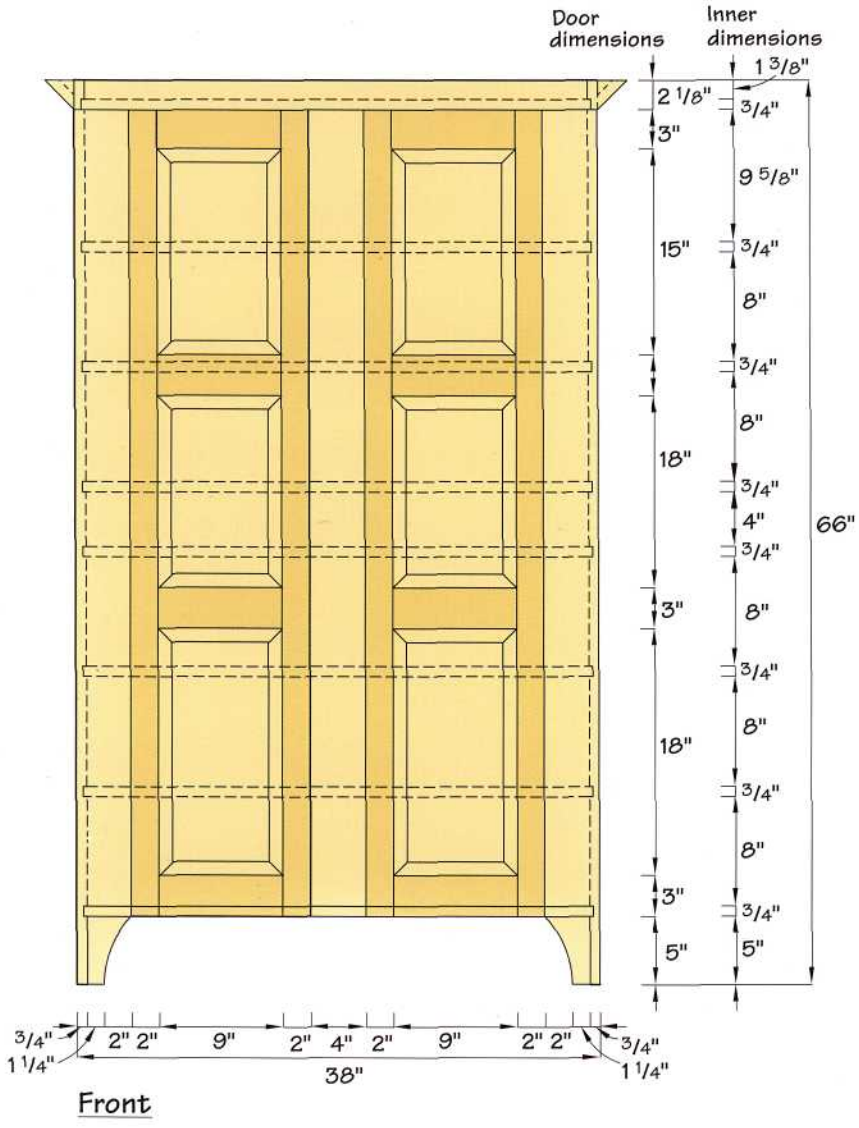
To think of a pantry is to think of a small, cold room beyond the kitchen where food, ingredients, utensils and other such culinary items are kept. Usually they're associated with large houses and butlers, but that's something of a misconception brought about by fiction writers such as Agatha Christie. I grew up in a house with a pantry. I remember it as a narrow, cold, dark place, lined with shelves and



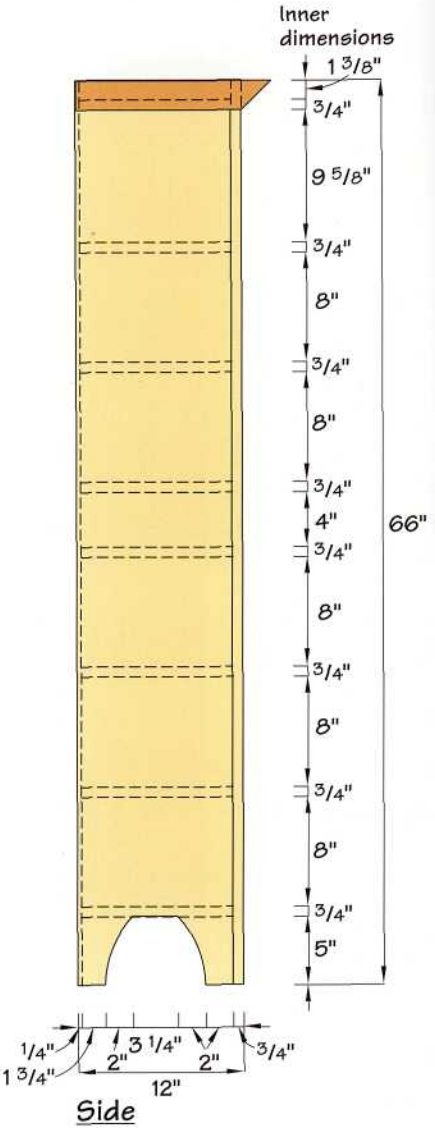
with a fine screen covering the tiny window. Here in America, in Colonial times, few settlers could afford homes with room enough for a pantry, so the pantry cupboard evolved. Always kept in the kitchen, it was a simple affair with two doors the full height of the piece, small legs to keep the food off the floor, shelves and perhaps a couple of drawers inside. They were almost always painted, often in bright colors, even white, and ours, a copy of one made in Pennsylvania around 1800, is no exception.



Top



Front



Side

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MATERIALS LIST

New England Pantry

No.	*Letter*	*Item*	*Dimensions T W L*
2	A	Sides	¾″×11¼″×66″
8	B	Shelves, Drawer Support, Bottom and Top	¾″×11¼″×26″
1	C	Trim	¾″×2″×38″
2	D	Trim	¾″×4″×64″
1	E	Trim	¾″×4″×59″
6	F	Shelf Cleats	¾″×¾″×3″
1	G	Crown	¾″×2″×3″
2	H	Crown	¾″×3″×13″
2	I	Back	¾″×5½″×66″
5	J	Back	¾″×5½″×61″
4	K	Door Stiles	¾″×2″×59″
4	L	Door Rails	¾″×3″×9″
4	M	Door Upper Panels	¾″×1½″×9½″
4	N	Door Center Panels	¾″×14½″×9½″
4	O	Door Lower Panels	¾″×18½″×9½″
4	P	Drawer Fronts	¾″×4″×13″
4	Q	Drawer Sides	¾″×4″×10″
4	R	Drawer Backs	¾″×3½″×11½″
4	S	Drawer Bottoms	¾″×12″×10½″
4	T	Drawer Guides	¾″×1″×11″

CONSTRUCTION OUTLINE

This is another fairly simple project. With the exception of the raised-panel doors, construction is quite straightforward.

The sides are made from single pieces of stock, dadoed to take the shelves, of which there are eight including the top, bottom and drawer support. The trim is fastened to the carcass with glue and nails as was done on the original, but you can use biscuits and glue if you like. If you do decide to use biscuits, you'll also need to use cleats and screws on the inside to hold the center trim to the shelves (these are allowed for in the materials list). The crown is constructed from three pieces of stock, mitered, glued and screwed to the top. The back is made from seven pieces of 3/4" pine stock butted together, similar to what you would find on an original piece, but you could use a single piece of lauan plywood. The drawers are set back just enough to allow room for the doors to close over the pulls and are made using simple lap joints, glue and cut-steel nails. The two doors are of raised-panel construction—the panels are irregular and sized to meet the demands of good design—and secured to the carcass with reproduction "H" hinges, stripped of paint and aged for authenticity. For the finish I chose first to stain the piece, then apply a couple of coats of dark green paint. You can expect to spend several weekends on this project.

BUILDING THE PANTRY

STEP 1. Cut all the pieces to size.

STEP 2. Mill the dadoes to the two sides as laid out in the drawing, then mark and cut out the details for the feet. (It's best to use your jigsaw for this operation.)

STEP 3. Sand both faces of the sides smooth and apply your chosen stain.

STEP 4. Sand both surfaces of all of the shelves, drawer support, bottom and top, then apply your stain.

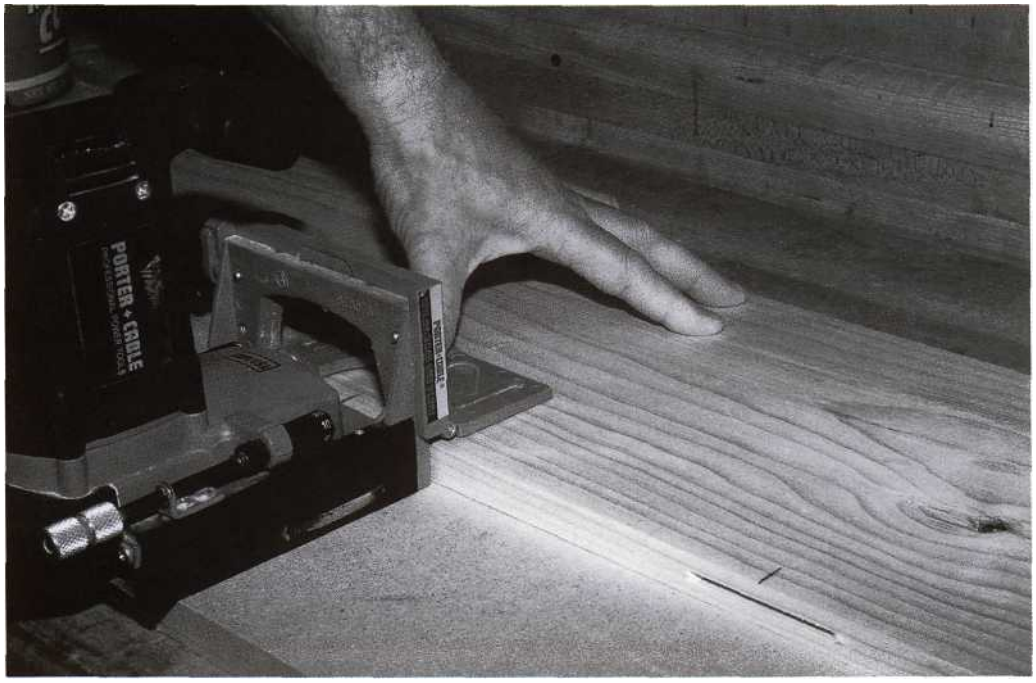
STEP 5. Using glue, clamps and toenails, assemble the carcass. Check the diagonals to make sure the structure is square, then set it aside overnight or until the glue is fully cured.

STEP 6. Sand all four pieces of trim smooth and apply stain.

STEP 7. There are a couple of ways to attach the trim to the carcass. You can glue, nail and clamp as I did, and as was done on the original, or you can biscuit them on. If you decide to use nails, skip the next four steps. Just set the nail heads and use a dark filler to cover the holes. They'll still show, but that's good; country carpenters 200 hundred years ago were not so particular as we are today. If you decide to use biscuits, remove the clamps from the carcass, lay it on its back, set the trim in place and mark for the slots. It's best if you allow 8" or 9" between biscuits.

STEP 8. Mill the biscuit slots.

STEP 9. Glue and clamp the trim in place and set the structure aside until the glue is fully cured.



You'll need to reinforce the butt joints between the two pieces of stock that make up the sides with biscuits or dowels. Ideally, these should be placed 8" to 10" apart.

For accuracy, when milling the dadoes, you can clamp two sides together and do both at once. You'll need to make sure your T square is exactly 90° to the sides, of course. You can make sure by measuring the setting at both ends of the square in relation to the top or bottom. Whichever you use, top or bottom, use the same reference point for each dado you mill.

STEP 10. Using no. 6 X *1 5/8"* screws, glue and screw the small cleats to the front underside of the six shelves, including the drawer support, the top and the upper front of the bottom.

STEP 11. Using no. 6 X 1%" screws, from the inside, glue and screw the center trim to the carcass. You'll need to drill pilot holes first. Make sure it is square to the outer trim and the openings match exactly.

cutting bit or your table saw to mill ^{5}/i6"-deep grooves to the inner edges of the rails and stiles that will make up the two doors.

STEP 13. Lay out the rails and stiles and mark for biscuit slots. You can use lap joints if you like, but you'll need to adjust the length of the rails to maintain the outer dimensions of the doors.

STEP 14. Mill the biscuit slots.

STEP 15. Dry fit the rails and stiles and measure the width and height between the grooves to ensure the panels will fit properly.

STEP 16. If necessary, trim the panels to size.

STEP 17. Sand the rails and stiles smooth and apply your stain.

STEP 18. Glue and clamp the rails and stiles, *one side only*, dry fit the other, ensure all is square, then set them aside until the glue is fully cured.

STEP 19. Set your table saw to cut at an angle of 17° and the rip fence at 1/4" and mill the bevels to the edges of the panels. The tip of the blade should just break through the surface of the stock, leaving a small step and nice clean lines.

STEP 20. Sand the panels smooth, paying close attention to the bevels, then apply the stain.

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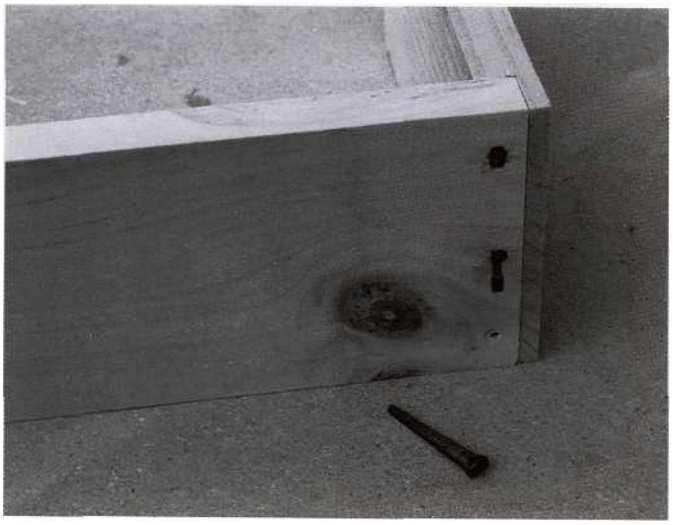
STEP 21. When the glue is fully cured, remove the clamps

Use a compass and pencil to mark the detail for the feet. You'll find your jigsaw the best tool for removing the waste.

For strength, glue and then toenail screw the shelves into the dadoes. When you've squared the carcass, and the glue has fully cured, you'll have a structure that's rock solid.



When you're putting the drawers together, drill pilot holes to ease the passage of the rather bulky cut-steel nails.

SHOP TIP

Fitting a Door

Fitting a door, or pair of doors, can often be something of a trial, especially if the frame or, in the case of a raised panel assembly, the door, is slightly out of square. Yep, it happens even to the best. This is the easy way to do it.

First, I always make my doors just a little larger than the opening, say ¼". The purists may say I'm cheating. Not so, just practical. You can always take a little off; you can't add a little on if you make a mistake. I don't have time and money enough to remake a raised panel door, or even a solid one for that matter.

Next I set the door in the opening and determine how to remove so it will fit closely.

Now, I remove excess material from the length of the door on the table saw. To remove it from the width I use the jointer.

If the door or opening is out of square, I cut the door to the correct length. Then, using the tapering technique described on page 87, I take the door to the jointer, set the machine to cut at a depth of 1/32", and make as many passes as necessary to remove enough material for the door to fit the opening. Usually two passes are quite enough.

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STEP 22. Slide the panels into place in the now open frames, glue and clamp the remaining stiles in place and set the completed doors aside to allow the glue to fully cure.

STEP 23. Glue and screw the four drawer guides in place, making sure they are square to the front openings.

STEP 24. Build the drawers as laid out in the drawing and Shop Tip at right.

STEP 25. Go to the finishing process below.

STEP 26. Attach the doors to the carcass.

STEP 27. Attach the hardware to the doors and drawers.

STEP 28. Set the swivel catches in place and fasten with no. 6 X 1 5/8" screws.

FINISHING

Your staining is all done, so all that's left is to do the appropriate distressing, painting and aging. First, do some light distressing around the trim, the corners and the edges of the doors, a little heavier around the feet, and then some final sanding with a fine-grit paper. Next, apply a couple of coats of polyurethane, then a couple of coats of a dark green paint of your choice. Allow the paint to dry completely, at least forty-eight hours, then go to the rubbing-down stage. You'll want the stain to show through in the areas that would be subject to heavy wear—around door edges, doorknobs, swivel catches, corners, outer edges of the carcass and around the feet. Next you'll need to complete the illusion by applying an antiquing glaze. I used pigmented paint thinner, but pigmented, diluted, water-based polyurethane would do the job just as well. Finally, you'll need to apply a coat of clear polyurethane for protection.

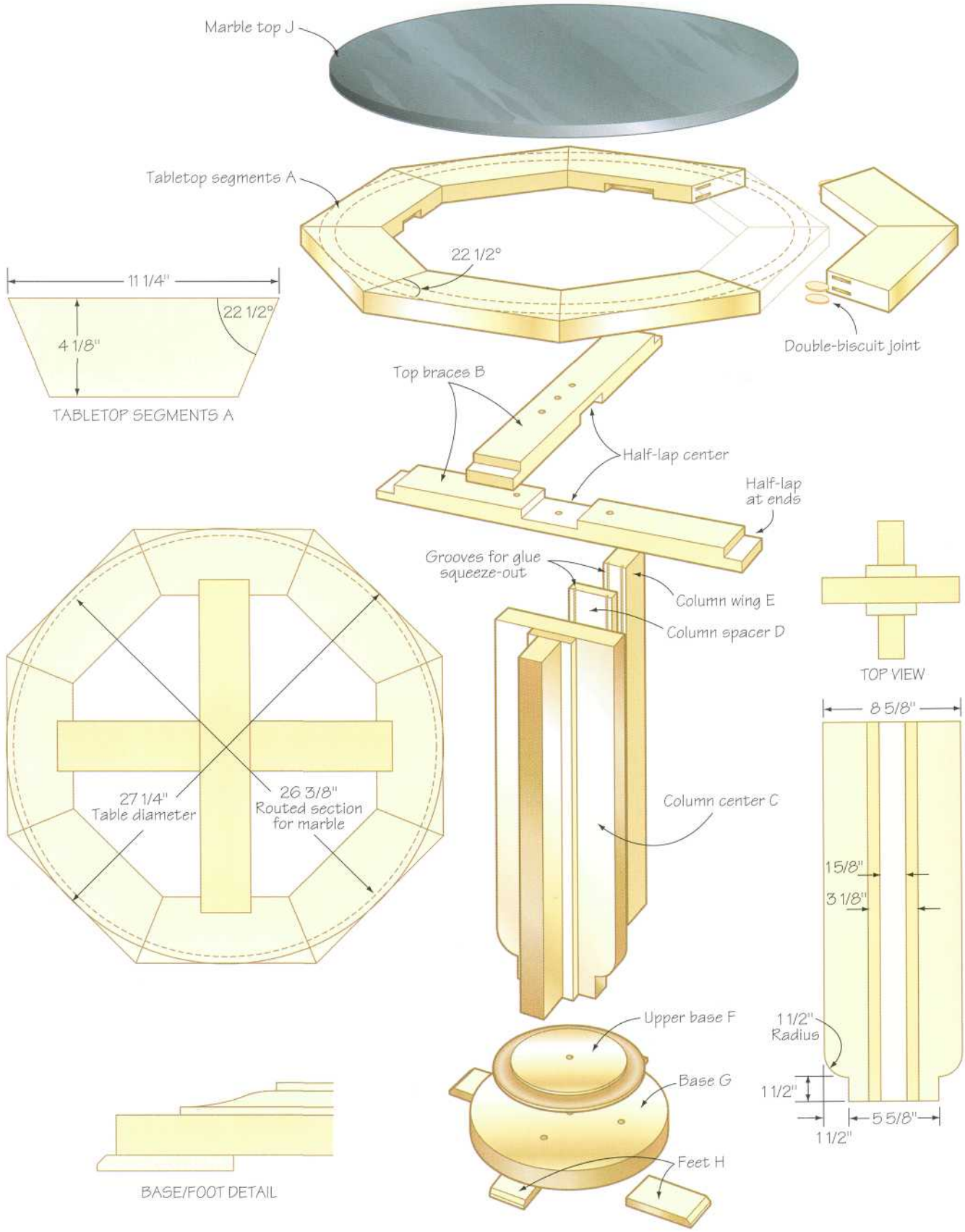
SHOP TIP

Simple Drawers

Most of the drawers you'll find in this book are made using very simple construction methods: lap joints, glue and cut-steel nails. This was the method most often used by the colonial craftsmen when working with pine. Pine tends to breathe, expand, shrink and swell, more so than the hardwoods, therefore lap joints were preferred to dovetails. I use cut-steel nails simply because they look more authentic than finishing nails. The method is as follows:

1. Cut all the pieces to size. The back of the drawer will be ½" narrower than the sides and front.
2. Rabbet the inside edges of the drawer fronts, ¾" wide and ½" deep, leaving ¼" of material on the outer face. I use my Delta tenoning jig to cut the cheeks, and my table saw to cut shoulders.
3. Rabbet the drawer sides on one end only, ¾" wide and ½" deep, leaving ¼"of material on the outer face.
4. Using one of the drawer backs as a template, set the table saw rip fence and blade to cut at a depth of ¼". Cut slots in both sides and the front to accept the ¼" plywood bottom. Cut once, then move the rip fence out ⅛" and cut again. Be sure you make two left- and two right-hand sides.
5. Assemble the drawer's using glue and cut steel nails, check the diagonals to ensure they are square, then clamp and set them aside until the glue is fully cured.
6. Fit the drawers bottom and secure it in place with a couple of brads to the back edge.
7. Attach the hardware.
8. Do any necessary finish sanding, break all the sharp edges and you're done.

MARBLE-TOP ARTDECO TABLE



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MARBLE-TOP ART DECO TABLE

inches (millimeters)

REFERENCE	QUANTITY	PART	STOCK	THICKNESS	(mm)	WIDTH	(mm)	LENGTH	(mm)	COMMENTS
A	8	tabletop segments	mahogany	1 3/4	(45)	4 1/4	(108)	11 1/4	(285)	22 1/2° cut BE
B	2	top braces	mahogany	1 1/2	(38)	3 1/8	(79)	20 7/8	(530)	1/2" (13) lapped center
C	1	column center	mahogany	1 5/8	(41)	8 5/8	(219)	23 3/4	(603)	
D	2	column spacers	mahogany	3/4	(19)	3 1/8	(79)	23 3/4	(603)	
E	2	column wings	mahogany	1 3/4	(45)	2 3/4	(70)	23 3/4	(603)	
F	1	upper base	mahogany	1	(25)	9 5/8	(245)	9 5/8	(245)	lathe-turned
G	1	base	mahogany	1 1/4	(32)	13 5/8	(346)	13 5/8	(346)	lathe-turned
H	4	feet	mahogany	1/2	(13)	1 5/8	(41)	4 1/4	(108)	
J	1	top	marble	3/4	(19)	26 3/8	(670)	round		

Note: BE = both ends.

hardware

8	No. 8 x 1 1/4" (32mm) Slotted-head wood screws	local hardware store
5	No. 8 x 2" (51mm) Square-drive deck screws	local hardware store
5	5/16" x 4" (8mm x 102mm) Lag screw with washers	local hardware store
12	No. 7 x 3/4" (19mm) Slotted-head wood screws	local hardware store
	Glue	
	#20 Biscuits	
	3/16" (5mm) Dowel pin	
	1/4" (6mm) Spacer	
	3/16" × 1" (5mm × 25mm) Dowel	
	Aniline dye stain	
	Lacquer, sealer and finish	

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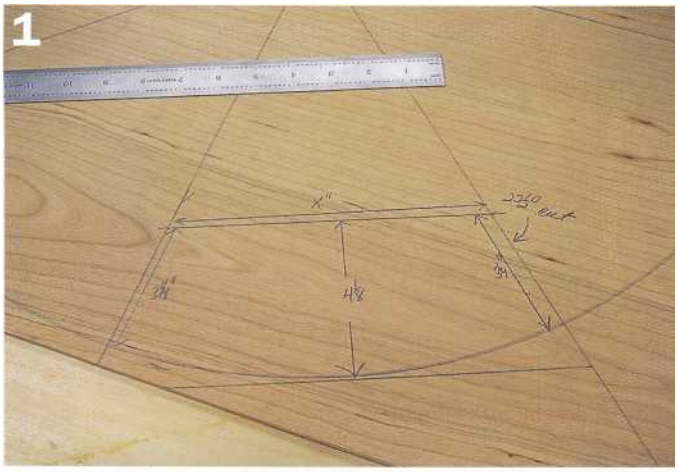
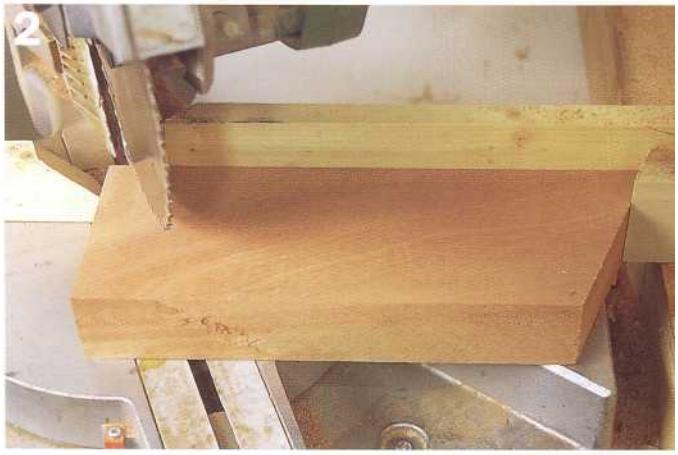
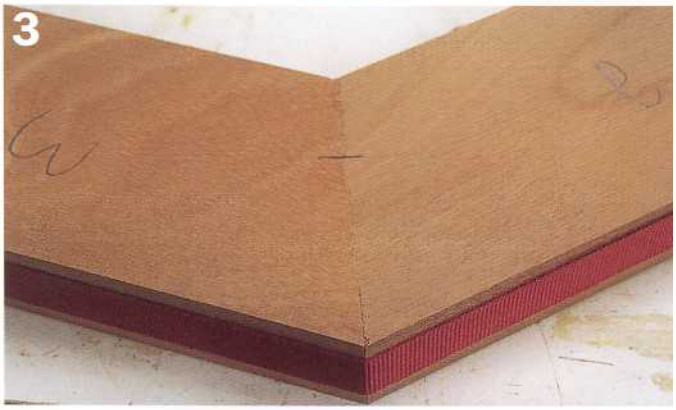


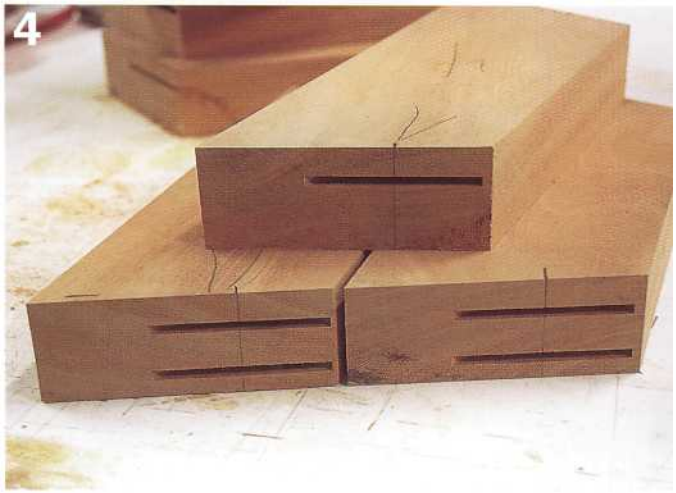
step 1 To start this piece, you need to determine the size of the segmented top. Create a full-size drawing of the round top and divide the circumference into eight sections. The eight sections determine the 22 1/2" cut for each end of the sections. Lay back 3 1/4" from the intersection of the circle and the section dividing line to ensure space for the biscuit joinery. From that back line, measure out to just past the apex of the circle. To copy my piece, the result is a 4 1/4"-wide piece that is ll 1/4" on the long side.



step 2 Mill your segment pieces to size and cut the 22 1/2^0 cuts on each end to form a pie-shaped piece. Repeat the cuts on all eight pieces.

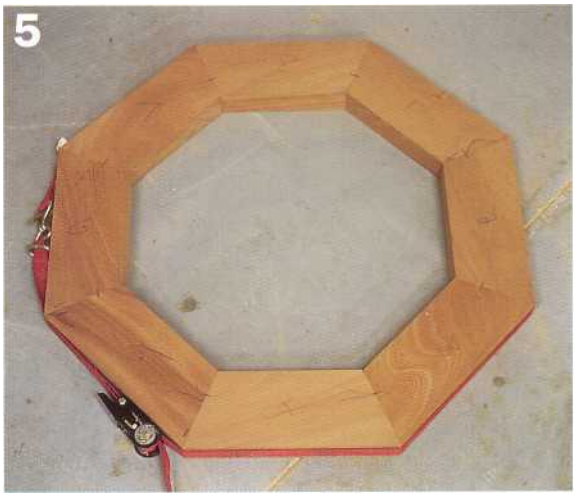


Step 3 Clamp the pieces with a band clamp. If your measurements were correct, the fit is tight. If you are off a bit, you can make small changes to the angle cuts on individual pieces to arrive at a tight fit. When ready, mark the location for the biscuit slot.

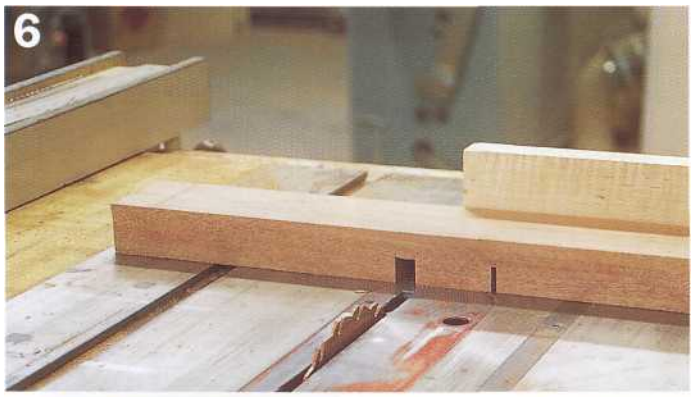


step 4 On the segments, transfer the layout line for the biscuit slots to both faces of the piece and cut one slot referenced to the top and one to the bottom, creating twin slots on each end.

step 5 Glue the ends with the biscuits in place and clamp with a band clamp until dry.



Step 6 Cut the top braces to size and create the half-lap center joint.

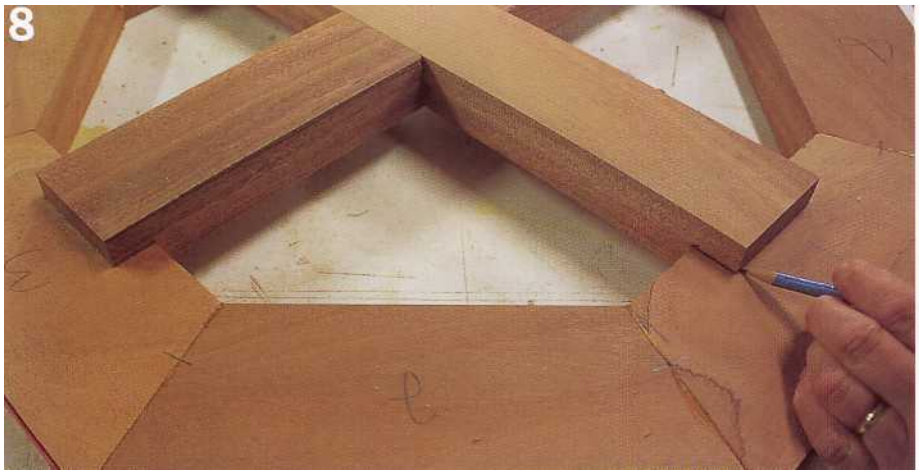


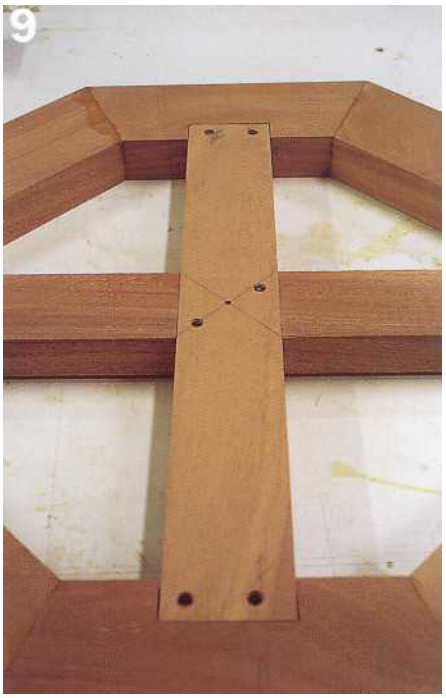
Step 7 Assemble the top braces and mark all four ends with an X. Separate the two and cut a 3/4" x 1" rabbet on the ends of each brace. Cut only the X-marked ends, so that when joined the braces have the cuts on the same face.

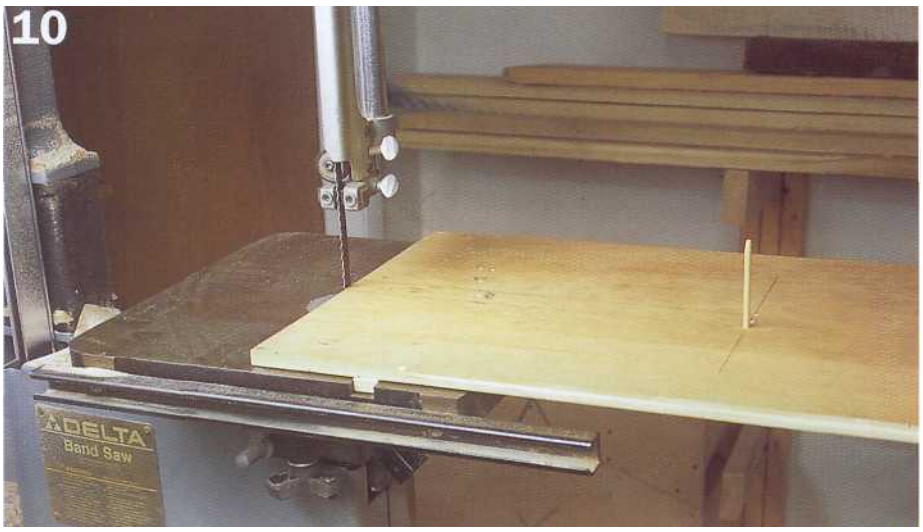
Step 8 Set the brace assembly in place on the underside of the joined top and mark the ends. Remove the necessary areas with a router or chisels. It helps to keep the brace in the same position to match the cuts, so mark one end with the top section location.

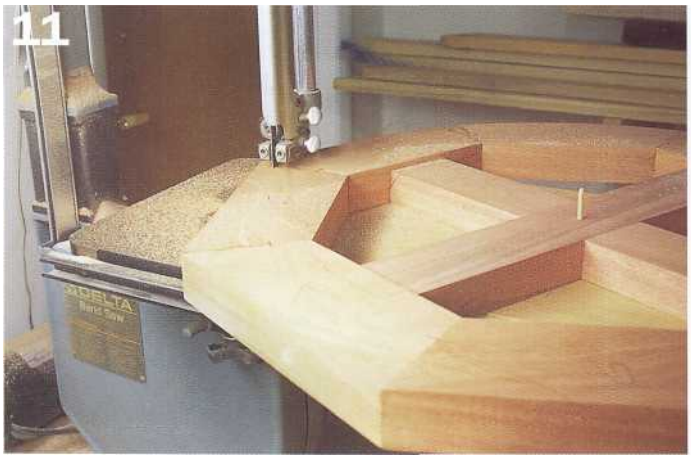
step 9 Before you attach the brace assembly to the top, locate a center in the brace and drill a 3/16" hole. Secure the brace with glue and 1 1/4" screws in the center, then attach the assembly to the top in the same manner.

step 10 Prepare your band saw to cut the top section to round. Attach a cleat that fits into the saw guide to a piece of plywood. Square a line from the blade and mark *13 1/8"*, or half the diameter of the finished top. Drill a 3/16" hole for a short dowel pin.







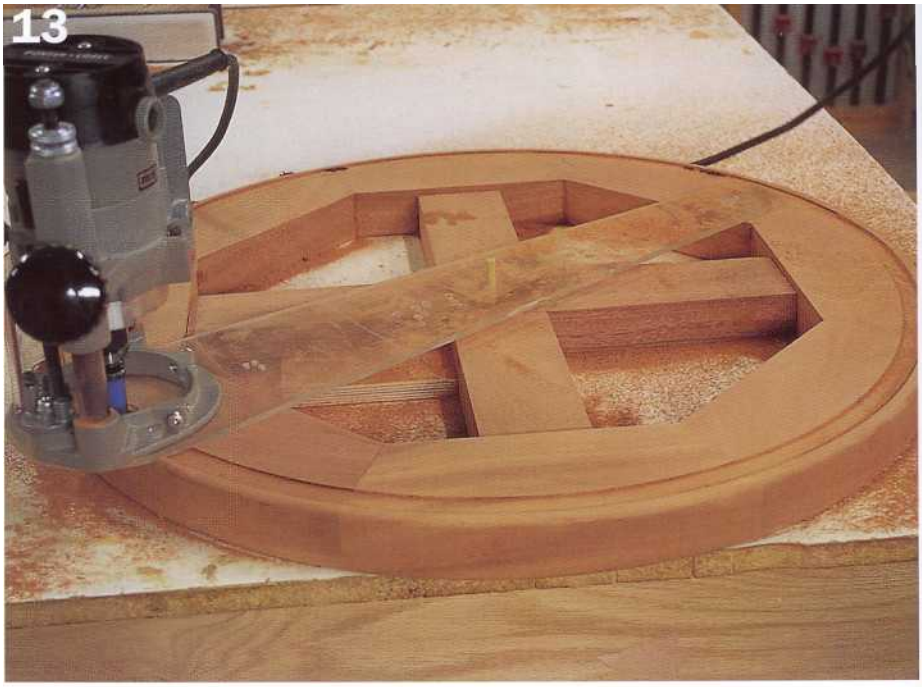


Step 11 Place the top section onto the pin in the plywood platform with a flat area at the blade. It will be a tight fit. Turn the saw on and slowly rotate the top section, cutting to a circle.

step 12 Once cut, sand all surfaces of the now round top. Round over both the top and bottom exterior edges with a 3/16" roundover bit.

step 13 Set up the plunge router with the circle-cutting jig. Place the 3/16" dowel pin in place, then add a 1/4" spacer to the pin. Set the router to cut 1/4" deep, and the outside cutting edge of the bit ($^3/_4$" straight) to be exactly $^5/16$" from the outside edge of the top. Hook the circle-cutting jig over the pin and plunge-cut the first pass on the top. With the outer edge defined, move to the extreme inside cut and repeat the process, each time moving toward the outer edge. This process allows the router base to rest on the existing material with each pass, and on the top's outer rim on the final passing cut. Also, notice how I lock the top in place with the plywood pieces. It will need to be secured.

step 14 When the cutting is complete, clean up the recessed top with a scraper.



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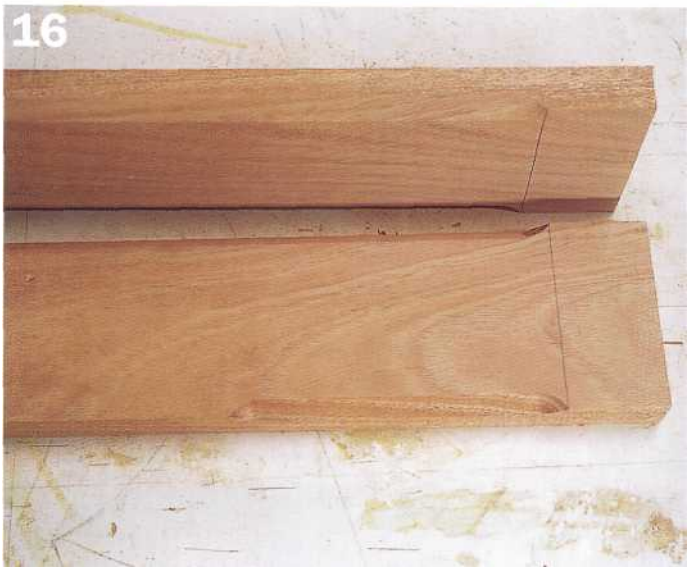
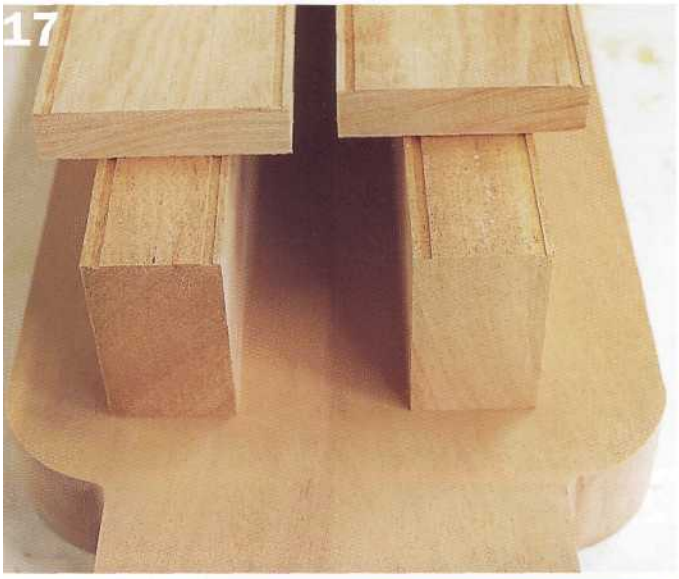
step 15 Next, mill the pieces for the column. Make the 1 1/2"-radius cut at both edges of the column center and one edge of each of the column wings. It is easy to create a simple jig and use a router and pattern bit to complete this step.





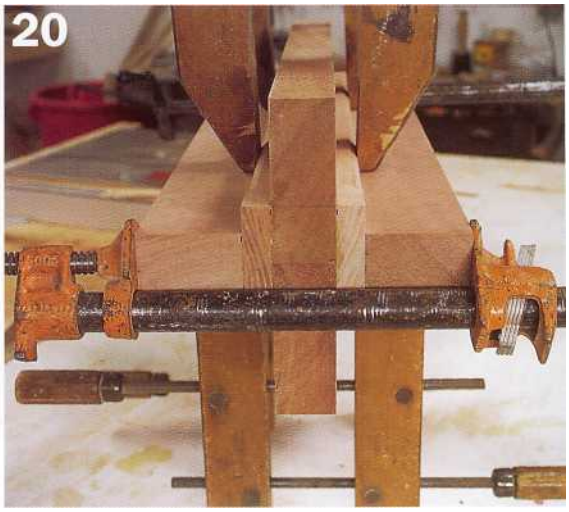
step 16 Use a chamfer bit and router on both edges of the two column spacers. Stay short of the ends for appearance.

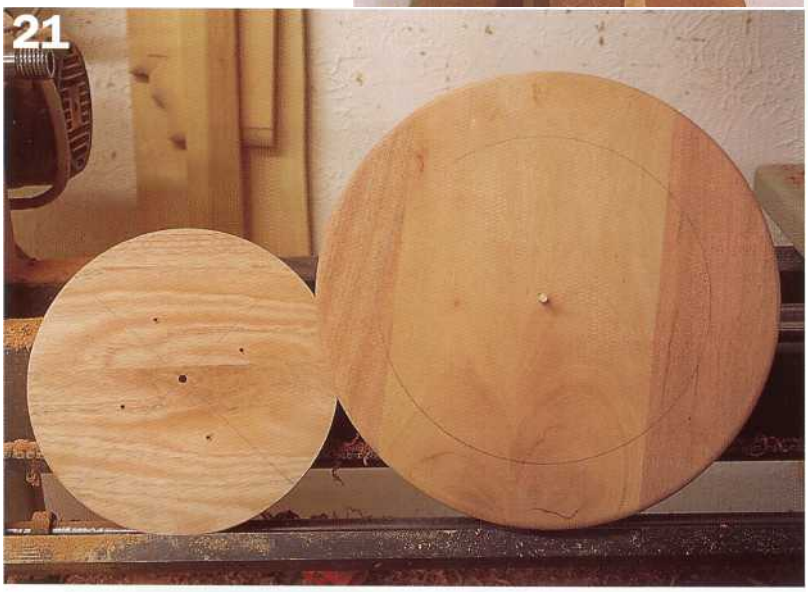
step 17 At the table saw, cut a shallow groove on the back sides of the spacers and wings. Make the cut on both edges. This will become a reservoir to prevent glue squeeze-out during the assembly of the column.

step 18 Attach the wings to the center of the spacers with glue and 1 1/4" screws. Use just enough glue to work; a slight excess should be caught in the grooves from the previous step, but too much will still result in squeeze-out.

Step 19 This is how the wing/spacer unit attaches to the column center. Because we are joining face grain, the connection is made with glue only.

Step 20 Make the connection in two steps: one side, then the other when the first is dry.





step 21 Mill and turn the upper base to profile and the base to size. With the base on the lathe, mark the exact center. Drill a $^{3}/16$" hole at center of the base and at the intersection of the lines used to mount the face plate onto the upper base (this is the bottom side).

step 22 Insert a short dowel into the base and slide the upper base onto the pin. Mark a line around the upper base onto the base. Remount the base on the lathe and cut a shallow groove just inside the marked line. This is another glue reservoir.

Step 23 Attach the upper base to the column with 2" screws, making sure the heads are countersunk.

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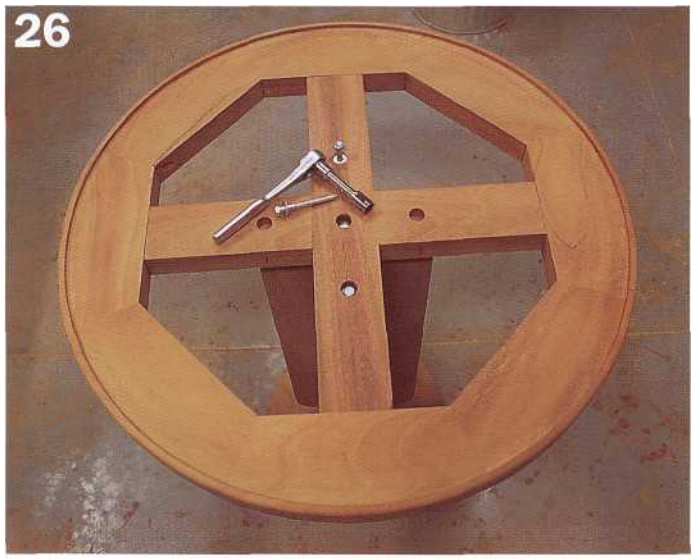
step 24 Spread glue onto the bottom side of the upper base and inside the groove cut into the top of the base. Using the dowel pin, attach the two and clamp until dry.

step 25 Mill the feet to size, cut a chamfer on the ends, then cut the blank into two equal pieces. Locate the feet directly in alignment with the column edges and attach with glue and 3/4" screws. Countersink the heads.

step 26 Predrill the top and column for the 5/16" lag screws. Drill a 7/8" countersunk hole in the top so that the washer and the lag-screw head will be recessed. Finish the hole with a 5/16" bit. Set the top in place on the legs and mark the hole locations. Predrill the column with a 1/4" bit. Attach the top to the column with the lag screws.

step 27 The finish I selected for this piece is a water-based aniline dye stain with a lacquer top coat. All that is left is to order the marble insert for the top and set it in place to finish the project.



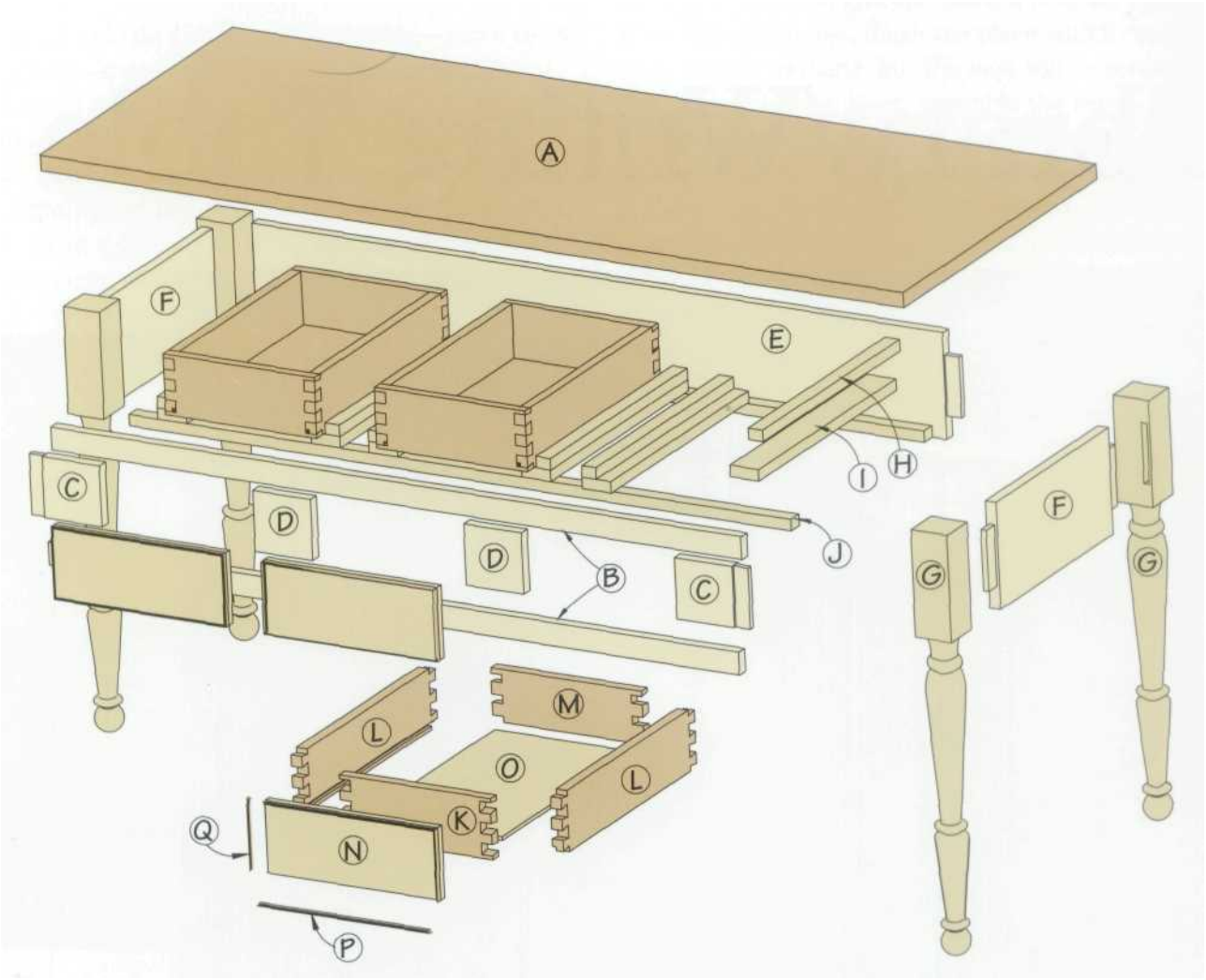
tip Here's a hint: If the marble proves to be a bit too costly, contact a kitchen countertop manufacturer for a solid-surface tabletop. These products will also work nicely and come in some great new colors and designs.

Library/Writing Table

These tables first appeared in America during the early 1700s. They were found most often in public places: libraries, town halls and courthouses. They were, of course, also found in many upper-class homes. The one I have chosen is an elegant piece, typical of the Queen Anne period, 1720-1750, with three drawers and turned legs. The original was a little larger. I've reduced the length from 72" to 60" so it will fit nicely into a smaller home.

CONSTRUCTION OUTLINE

Other than the legs (if you don't have a lathe you can use tapered legs) construction is fairly simple: the top is made from several pieces of furniture-grade pine, a full 1" thick, biscuited and glued together; the front, back and sides are mortised and tenoned to the legs; the front is a frame made from six pieces of stock; and the legs are made from 2 1/2"-square stock turned to an original design. The drawers have false fronts glued and screwed to through dovetail jointed carcasses. The hardware is early American and typical of the period**.** Finally, the piece is stained and finished with shellac to give it a deep shine.



MATERIALS LIST

Library Writing Table

No.	*Letter*	*Item*	*Dimensions T W L*
1	A	Top	¾″×24″×60″
Apron			
2	B	*Front Apron	¾″×1½″×50″
2	C	Ends	¾″×4″×4½″
2	D	Dividers	¾″×4″×4″
1	E	*Back Apron	¾″×7″×50″
2	F	*End Aprons	¾″×7″×16″
4	G	Legs	2½″×2½″×29″
6	H	Drawer Guides	¾″×1″×16¼″
6	I	Drawer Guides	¾″×2″×16¼″
2	J	Cleats	¾″×1″×46″

No.	*Letter*	*Item*	*Dimensions T W L*
Drawers			
3	K	Fronts	¾″×4″×10½″
6	L	Sides	¾″×4″×16½″
3	M	Backs	¾″×3½″×10½″
3	N	False Fronts	¾″×4¾″×12″
3	O	Bottoms	¼″×9½″×16¼″
6	P	Beading	⅛″×⅜″×12″
6	Q	Beading	⅛″×⅜″×4¾″

*Includes Tenons

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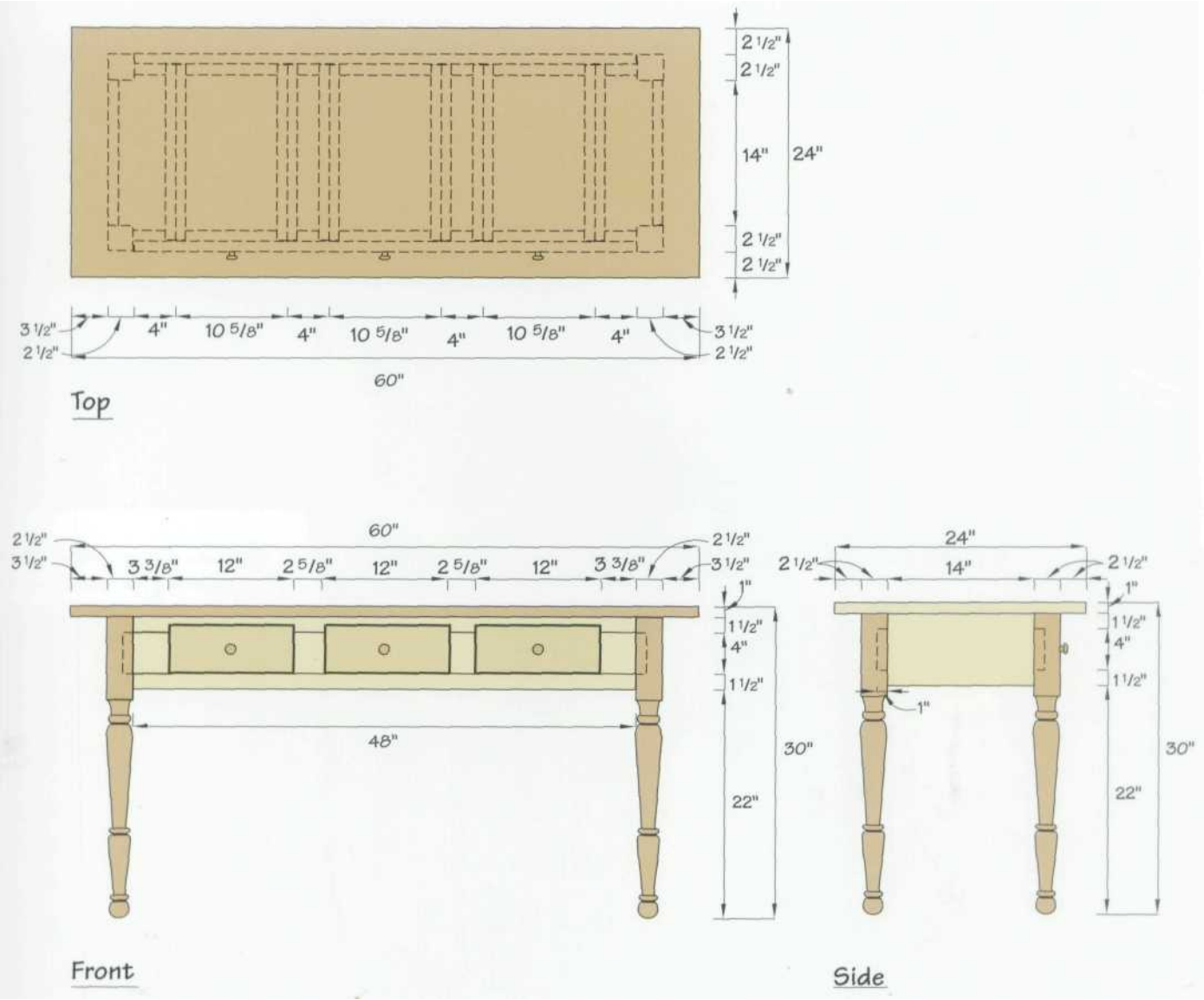

BUILDING THE TABLE

STEP 1. Cut all the pieces to size.

STEP 2. Build the board that will form the tabletop.

STEP 3.Use a 1/2" roundover in your router and round the upper edge of the tabletop.

STEP 4. Sand the top smooth.

STEP 5. Using the scale pattern, turn the legs to shape.

STEP 6. Sand the logs smooth.

STEP 7. Cut mortises, 4" long X 3/8" wide X 1" deep, to the inside faces of the lops of all four legs as laid out in the drawing.

STEP 8. Using the six pieces of stock as laid out in the drawing, build the frame that will become the front section.

STEP 9. Cut tenons, 4" long x 3/8" wide x 1" deep, to the back and both sides of the apron.

STEP 10. Dry fit the apron to legs and make sure everything fits properly.

STEP 11. Disassemble the structure, then glue and clamp it and set it aside until the glue is fully cured.

STEP 12. Build the drawer guides.

STEP 13. Glue and screw the four cleats that will hold the top to the understructure in place to the top of the understructure.

STEP 14. Glue and screw the two drawer supports in

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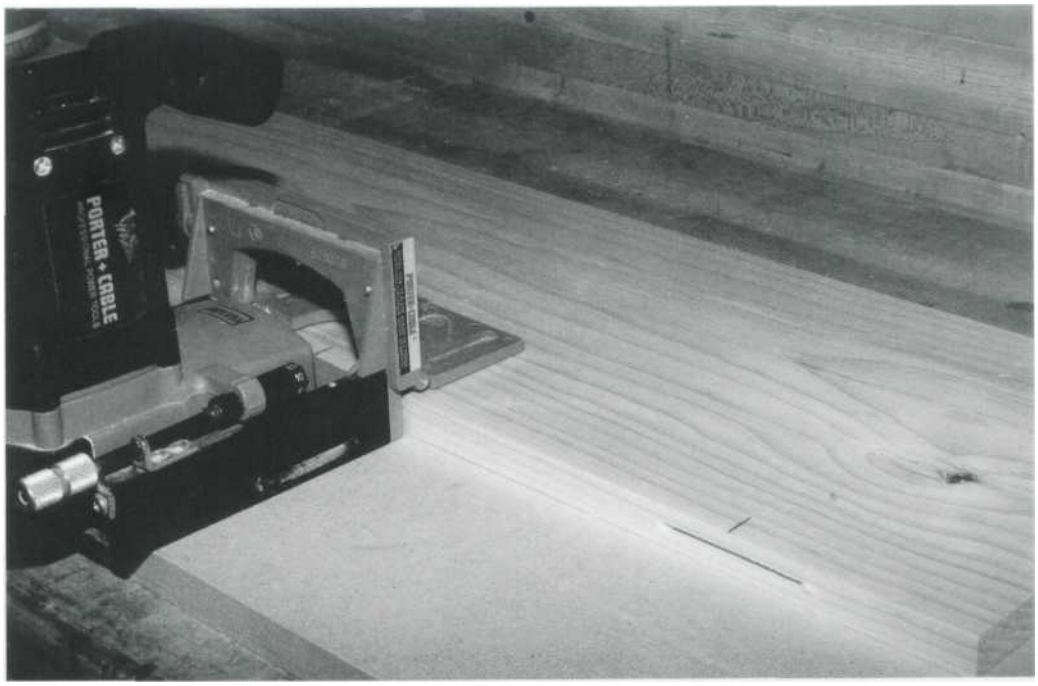
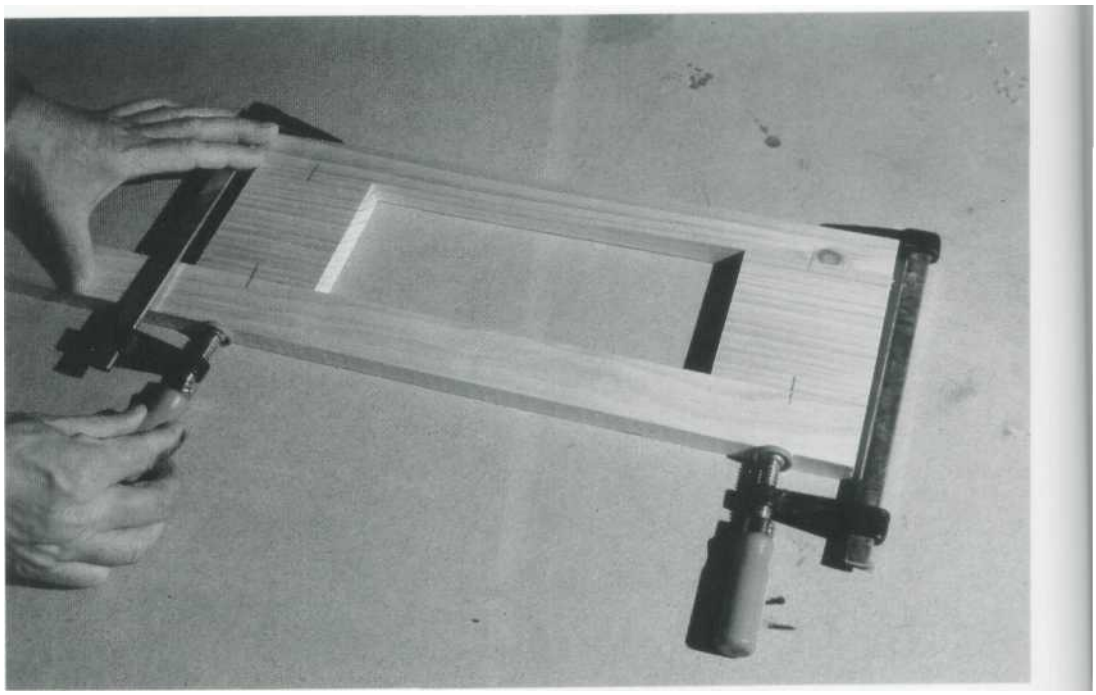


When you build the top, place your biscuits about 8" to 10" apart.

The front is easy to assemble. Jus! mark for biscuits, mill the slots, apply 11K[1] glue and clamp. Leave overnight, or until the glue is fully cured, and then mill the slot for buttons that will hold the lop to the subframe.



place to the lower edge of the understructure.

STEP 15. Set, the drawer guides in place on the supports and secure them using no. 6 X 1 3/4" screws.

STEP 16. Set the tabletop on the bench, underside up.

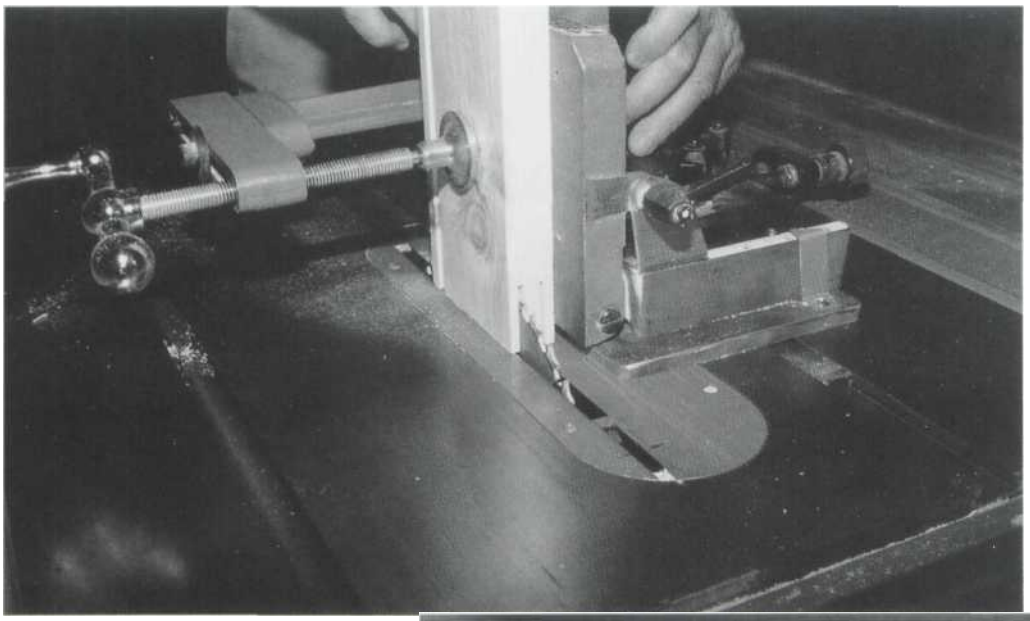
STEP 17. Set the carcass in place and secure to the top using ten no. 6 X 1 5/8" screws—four along each side cleat and one at each end. Elongate the holes to give the top room to breathe.

STEP 18. Using your router and dovetail jig, cut the through dovetail joints to the fronts, sides and ends of the drawers.

STEP 19. Set your table saw to cut at a depth of ¼" and cut the slots to the sides and fronts of the drawers that will receive the bottoms.

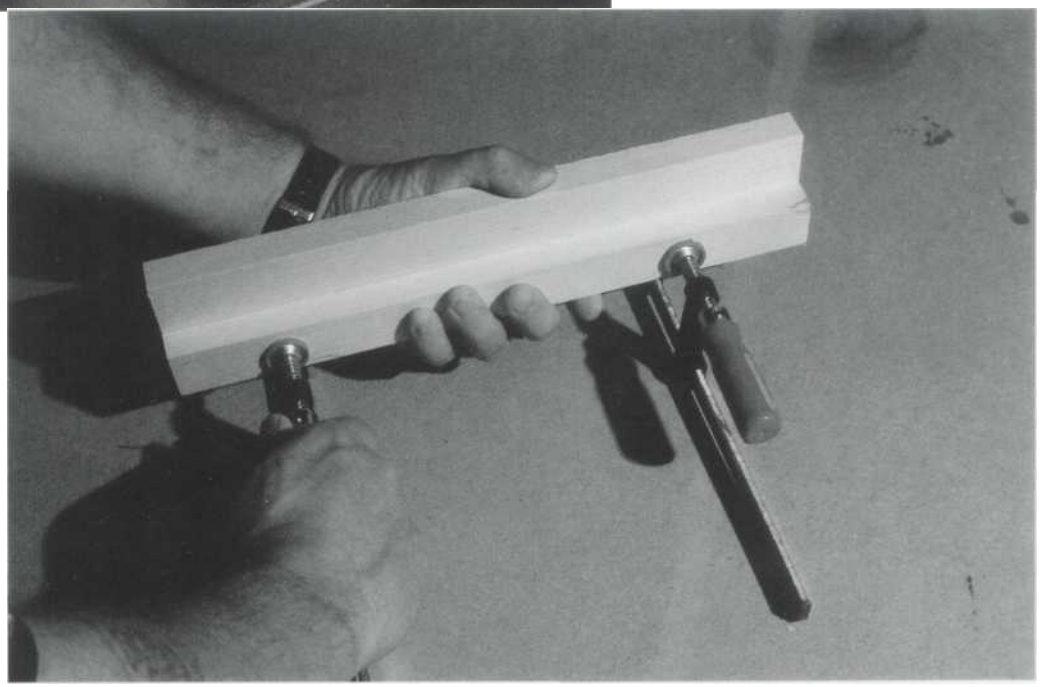
STEP 20. Dry fit the drawers to make sure they fit together properly, then glue, clamp and square them, and leave them overnight or until the glue has fully cured.

STEP 21. Use your router and a 1/4" roundover bit to trim



When you've milled the slot in the rails for the buttons that will hold the top to the sub frame, you can use your trusty tenoning jig to cut the tenons.

The drawer guides are easily made from two pieces of sleek, glued and clamped together. If you like, you can secure them with a couple of screws for extra strength.



the edges of the false drawer fronts to their final shape.

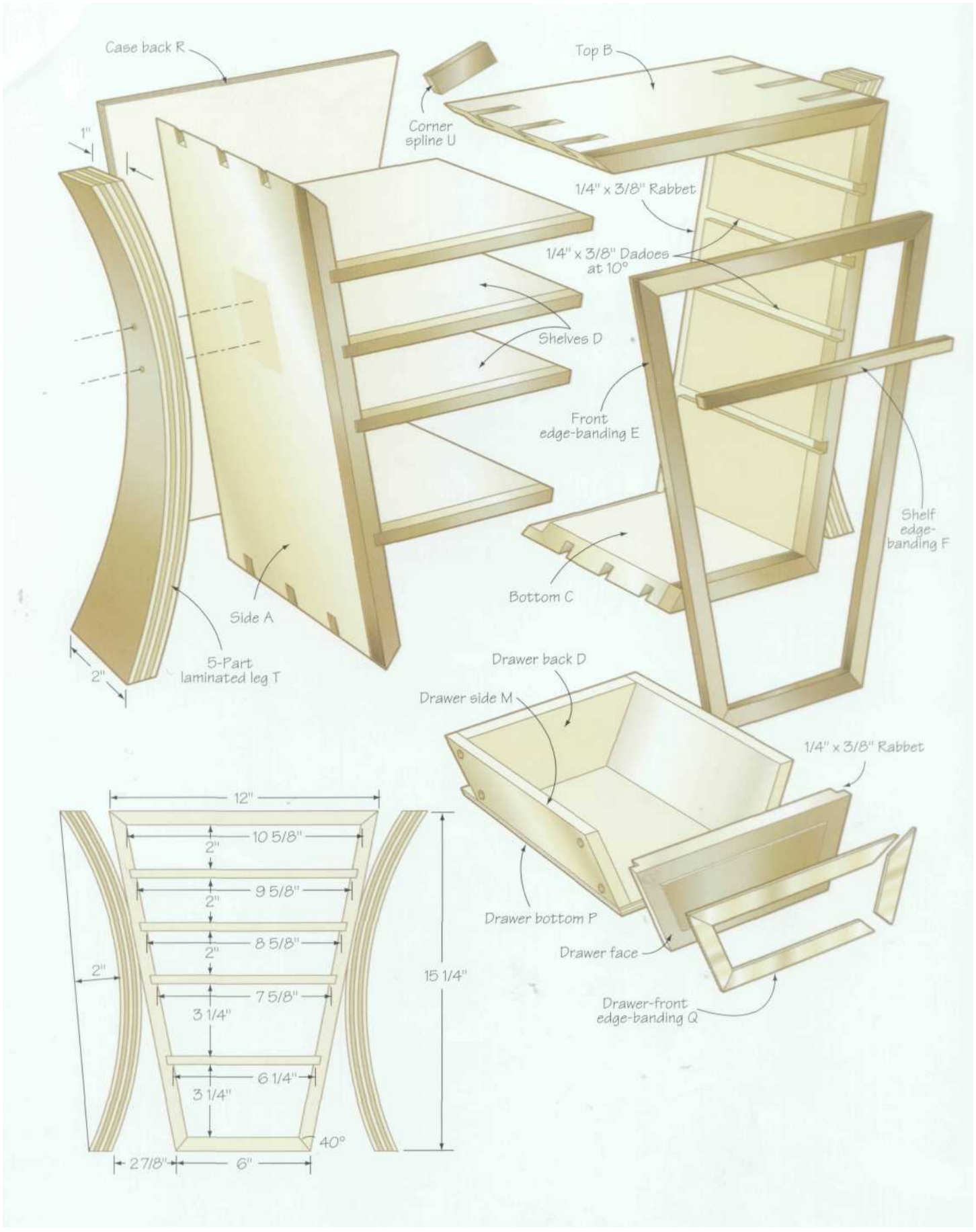
STEP 22. Complete the construction of the drawers by Fastening the hardware to the false fronts, the false fronts to the carcasses and the bottoms to the slots provided.

STEP 23. Do the final finish sanding. You'll need to take your time over this stage. The better the job you do, the better the Final finish will be.

FINISHING

I wanted a light finish for this piece, so I chose Puritan Pine stain made by Minwax. This I topped off with four coats of orange shellac at a three-pound cut. Each coat was allowed to dry for twenty-four hours before the next was applied. Also, I lightly sanded between coats with 400-grit paper.

Jewelry Box



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JEWELRY CHEST

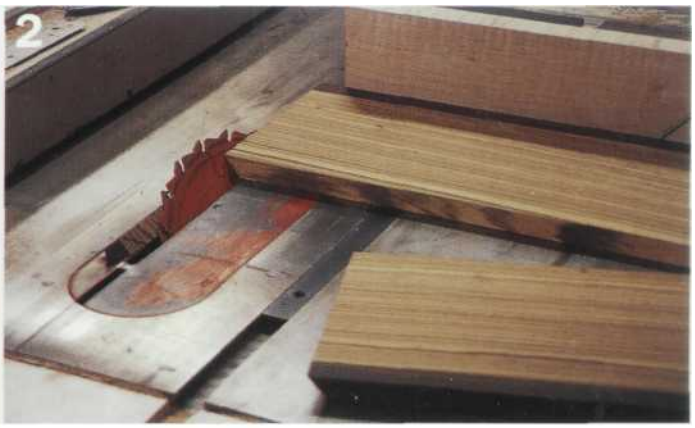
inches (millimeters)

REFERENCE	QUANTITY	PART	STOCK	THICKNESS	(mm)	WIDTH	(mm)	LENGTH	(mm)	COMMENTS
A	2	sides	zebrawood	5/8	(16)	5 5/8	(143)	15 1/2	(394)	
B	1	top	zebrawood	5/8	(16)	5 5/8	(143)	12 1/8	(308)	
C	1	bottom	zebrawood	5/8	(16)	5 5/8	(143)	6	(152)	
D		shelving	zebrawood	3/8	(10)	5 1/4	(133)	3 1/2 lf	(1067)	
E		front edge-banding	wenge	1/4	(6)	5/8	(16)	4 lf	(1219)	
F		shelf edge-banding	wenge	1/4	(6)	3/8	(10)	3 1/2 lf	(1067)	
G	1	bottom drawer front	wenge	5/8	(16)	3 1/4	(82)	6 1/4	(158)	
H	1	drawer 1 front	wenge	5/8	(16)	3 1/4	(82)	7 3/16	(183)	
J	1	drawer 2 front	wenge	5/8	(16)	2	(51)	8 5/8	(219)	
K	1	drawer 3 front	wenge	5/8	(16)	2	(51)	9 9/16	(243)	
L	1	top drawer front	wenge	5/8	(16)	2	(51)	10 9/16	(268)	
M	6	2" (51) drawer sides	maple	3/8	(10)	2	(51)	5 1/4	(133)	angle-cut
N	4	3 1/4" (82) drawer sides	maple	3/8	(10)	3 1/4	(82)	5 1/4	(133)	angle-cut
P	1	drawer bottom	Baltic birch ply	1/4	(6)	12	(305)	30	(762)	
Q		drawer-front edge-banding	zebra	1/8	(3)	1/2	(13)	as needed		edge all sides of all drawers; use cutoffs from case and shelving
R	1	case back	Baltic birch ply	1/4	(6)	12	(305)	30	(762)	
S	2	drawer pins	walnut dowel	1/4	(6)			36	(914)	
T	10	laminated legs	wenge	3/16	(5)	2 1/8	(54)	17	(432)	5 pieces per leg
U	12	corner splines	wenge	1/4	(6)	5/8	(16)	1 3/4	(45)	

hardware

5	Knobs	item #REIB-00	contact Aquabrass.com to find store
	Cyanoacrylate glue with accelerator		
	Felt liner for drawer bottoms		
	3/4" (19mm) Brad nails		
	No. 6 x 1 1/4" (32mm) Square-drive face-frame screws		
	2 1/2" (64mm) Drywall screws for making the jig		
	Screw-hole plugs		
	Oil/varnish mixture		
	Wax		

Step 1 Glue and cut to size the material for the lour pieces of the case.



step 2 Set the saw blade at 40° and make the cuts on the bottom edge of the side pieces, as well as both ends of the bottom piece, while laying the material flat on the surface of the saw.

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step 3 Position the fence on the left side of the blade and make the cut for the top edge of the side pieces and both ends of the top piece, creating a chiseled edge on the material. Here you can see that I raised the blade through a scrap piece of plywood in order to better control the work, eliminating any potential problem with the throat clearance.

step 4 Assemble the pieces check the fit and make any adjustments**.** Then lay out the shelf locations according to the plan.

step 5 Set the dado blade to a 3/8" cut, tilt the blade to 10° and plow the grooves for the shelves in each side. Set the distance from the fence and cut both sides at the same setting, making sure the sides are mirror images.

step 6 Next, cut the 3/8" x 1/4" rabbet for the case back.

step 7 Assemble the case with band clamps and glue, and while the glue sets cut the shelves to size, using the case as a guide. . Then lay out the shelf locations according to the plan.

step 8 Make the 1/4" cuts for the splines to reinforce the angled corner joints (see project nine, step 20 for information and procedure). Glue the splines in place and sand them flush with the case.

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step 9 Slide the shelves into place with a bit of glue at the back edge, then attach the front edge-banding and shelf edge-banding to hide the shelf dadoes, as shown in the photo.

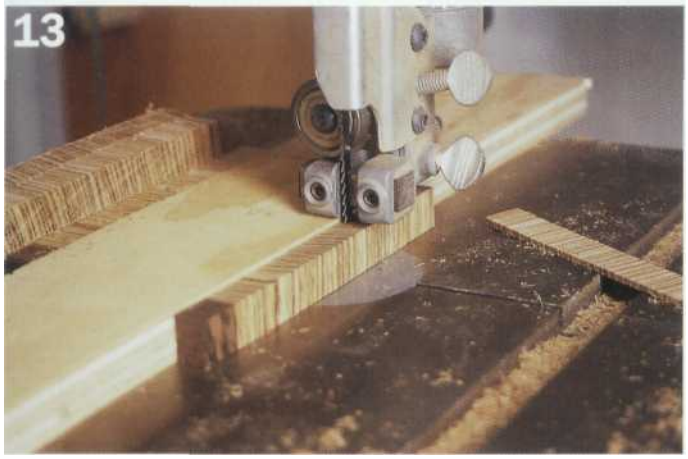
Step 10 Next, rip the drawer-front material to size and cut the fronts to fit the case openings. After the fronts are cut, install the plywood case back and nail it into place.

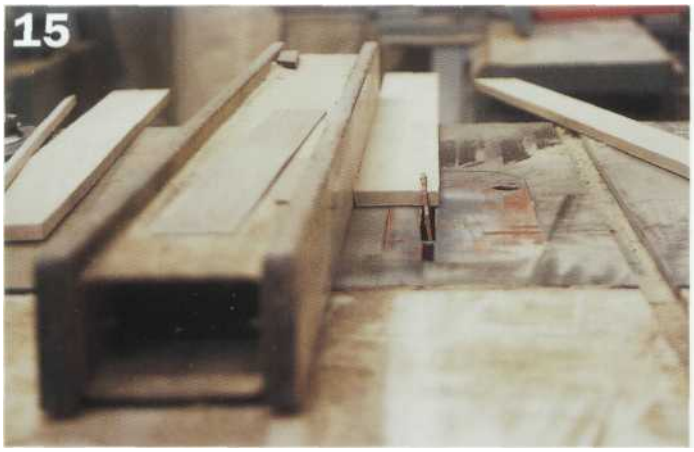
step 11 Mark the fronts and mill the 3/8" x 1/4" rabbets for the drawer sides and the 1/4" x 1/4" rabbets for the bottoms.

Step 12 Raise the blade to 1/2" and set the fence 1/2" from the blade to create the area for the drawer edge-banding. Cut all four sides of each front.

step 13 Using the cutoffs from the case and shelving, cut 1/2"-wide strips for the banding. At the band saw, rip those pieces into the 1/8"-thick banding.

Step 14 Fit the banding to each drawer. I used a cyanoacry-late glue with accelerator for instant setting.

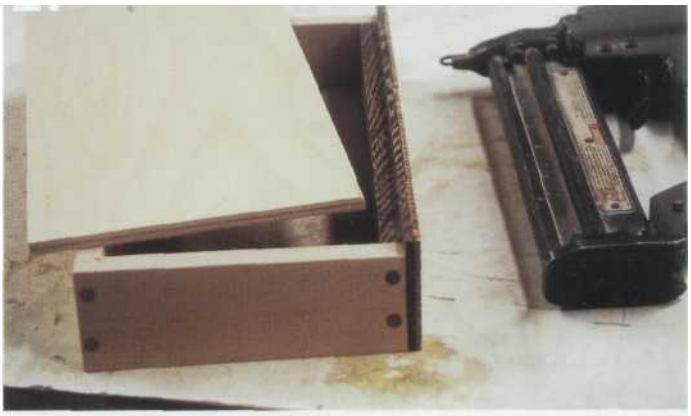


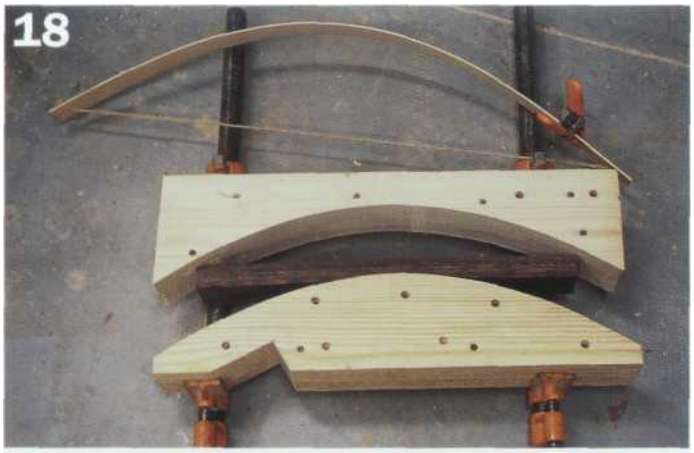


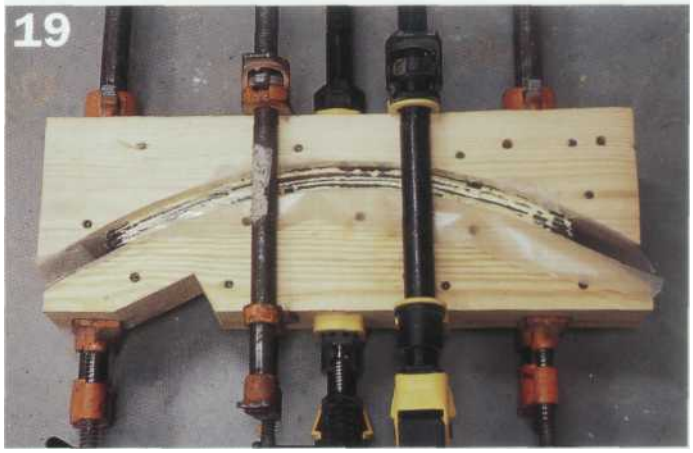
Step 15 Mill the remaining drawer material to size by setting the blade angle to 10° and cutting enough stock for both the 2" and 3 1/4" drawers. Cut the sides and backs. Remember to cut the pieces 1/4" less than the drawer fronts to accommodate the drawer bottoms.

step 16 Assemble the drawers. 1 chose to glue the pieces and then, when dry, drilled a 3/16" hole for a walnut dowel for contrast. You may also elect to simply nail the drawers together.

step 17 With the drawers ready, position the bottoms, leaving them a bit long, and nail. Fit the drawers into the case, using the plywood bottoms as stops against the case back.







Step 18 Using a string and stick jig, set the desired bend for the legs. Make a quick bending jig with two pieces of 2x6 framing lumber and 2 1/2" drywall screws. Create the jig, remembering that the spring back is approximately 1/2" (overbend the material to allow for the spring back).

step 19 With the leg strips cut to size, apply glue to each matching face and clamp into the jig. Use a piece of wax paper to keep the squeeze-out off the jig. Set this aside until dry and repeat the process for the second leg.

step 20 With both legs laminated **and** dry, clean the glue from one edge and run each leg over the jointer to make a smooth and true 90° edge to the lace. Then set the saw to cut at 2".

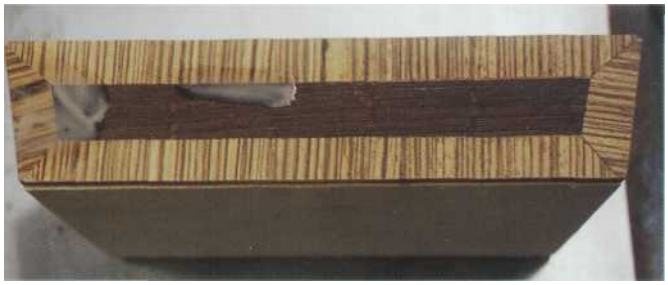
Step 21 Set the legs against the case on a level surface, slide a 1/2"-thick piece of wood up to the leg edge and mark the cut line parallel to the level surface. Set the leg at the miter saw, align the mark with the blade and make the cut while holding the piece in place. Cut both leg bottoms then reset alongside the case and mark the top of each leg equal with the case top. Repeat the cutting steps.

step *22* With the case laid on its back, set the legs against the side and, using a 1/4"- thick piece of scrap, mark and cut away an area that will produce a true, flat joint with which to connect the leg to the case.

Step 23 With the legs cut to height and fit to the sides, lav out and cut the taper of 1/2" per side on the band saw, narrowing to the top of the leg. finish with a light pass over the jointer to clean up the cut.

Step 24 Attach the legs to the case with screws and plug the 3/8" holes with appropriate material.

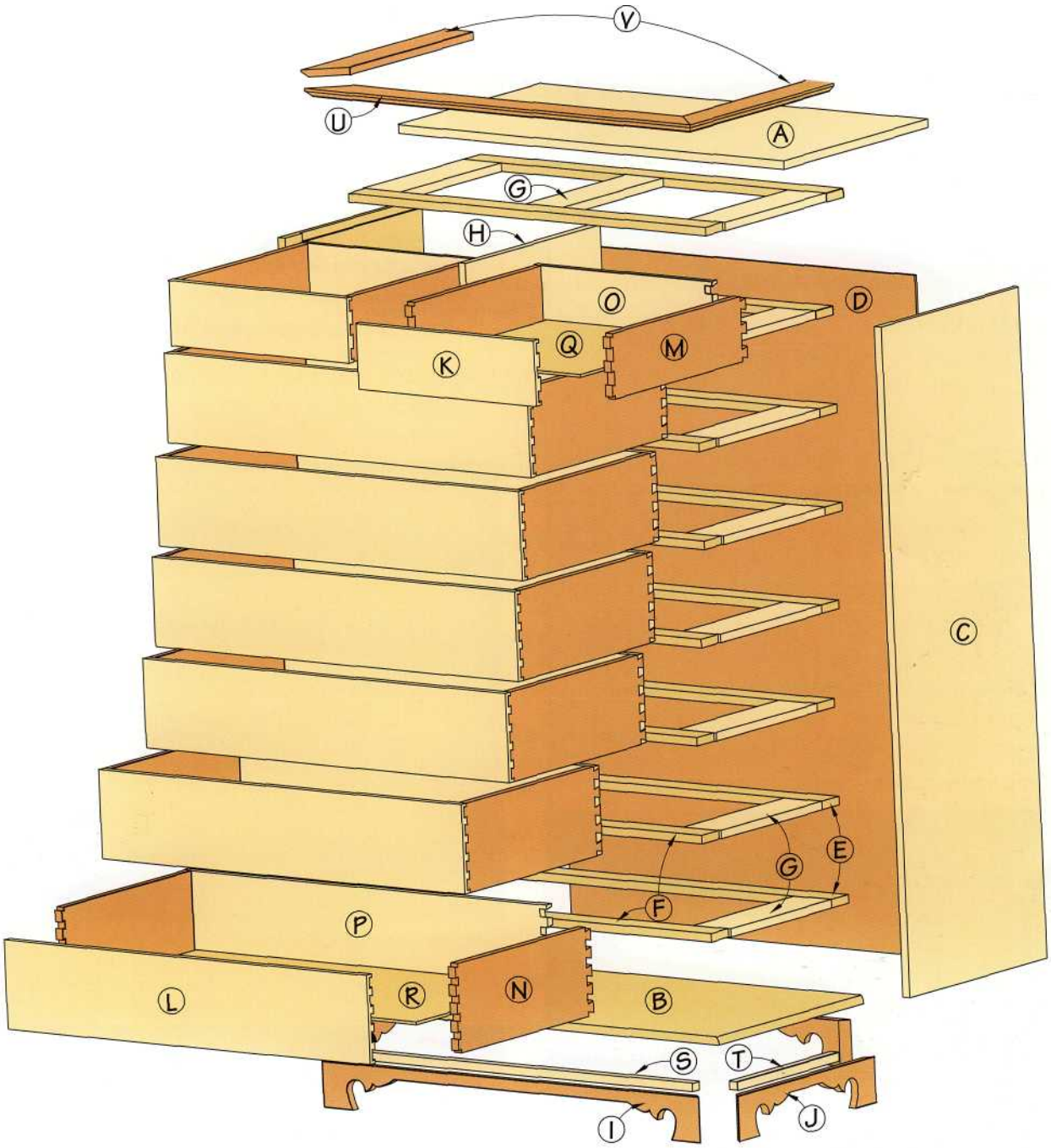
step 25 I finished this piece with three coats of an oil/varnish mixture, allowed it to dry completely, then waxed the entire piece. Finally, add the selected hardware and install felt into the drawers.



tip To close up any small gaps between the edge-banding and drawer fronts, apply a small amount of dark wood glue, and sand the surface, allowing the glue and sawdust to mix and fill the spots.

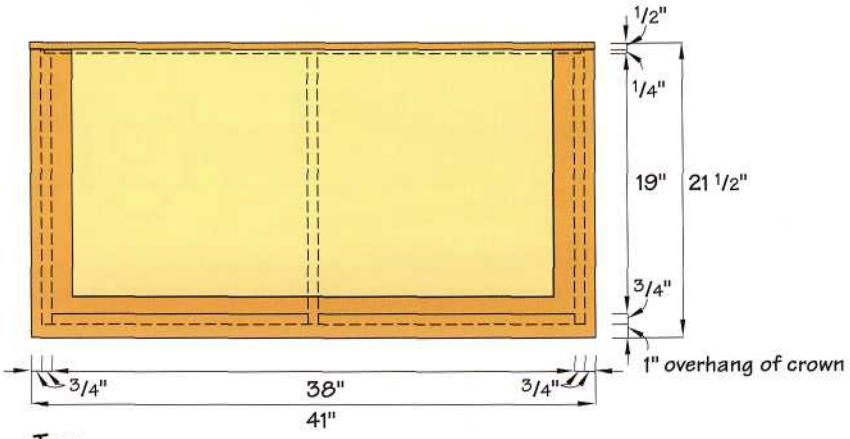
High Chest

The chest of drawers was the result of the natural evolution of the blanket chest. First came the "chest on drawers." First one drawer, then another and another were added to the simple blanket chest until, finally, by the turn of the eigthteenth-century, the box section had been done away with altogether, leaving the chest of drawers we know so well today. Mr. Chippendale's famous *Gentleman and Cabinet-Maker's Director* of 1774 shows several nice versions. The high chest I've chosen is a copy of one found in Charleston, South Carolina, circa 1790-1810.

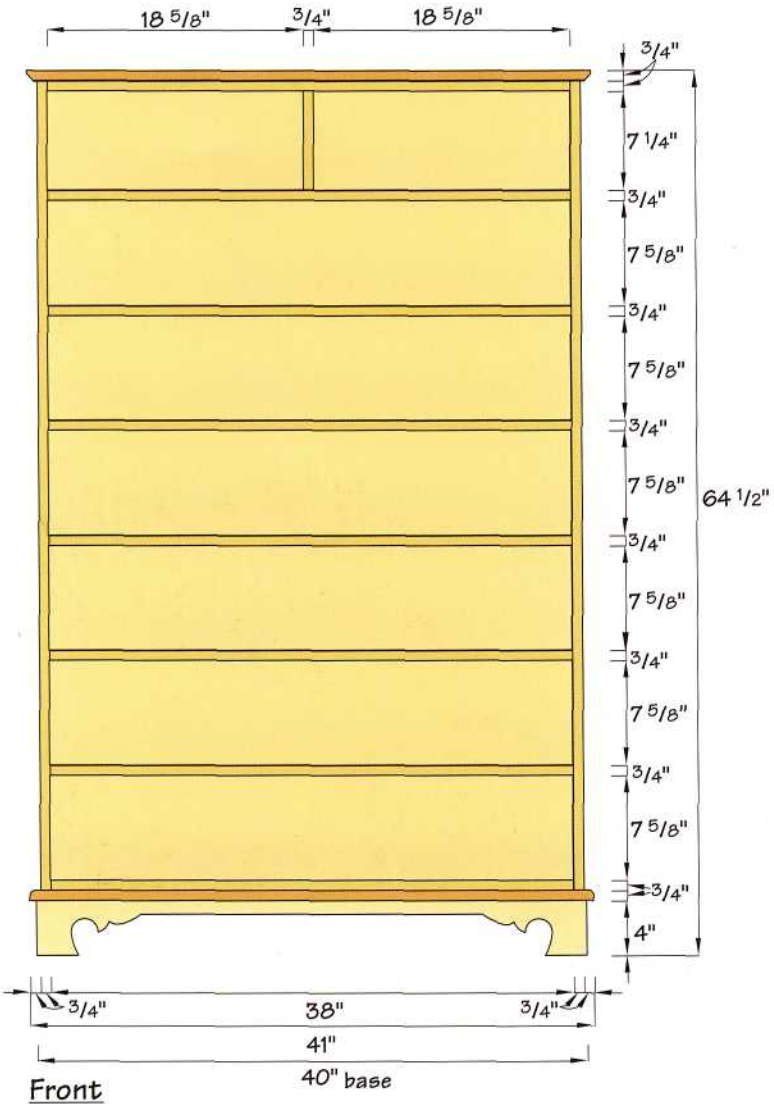


CONSTRUCTION OUTLINE

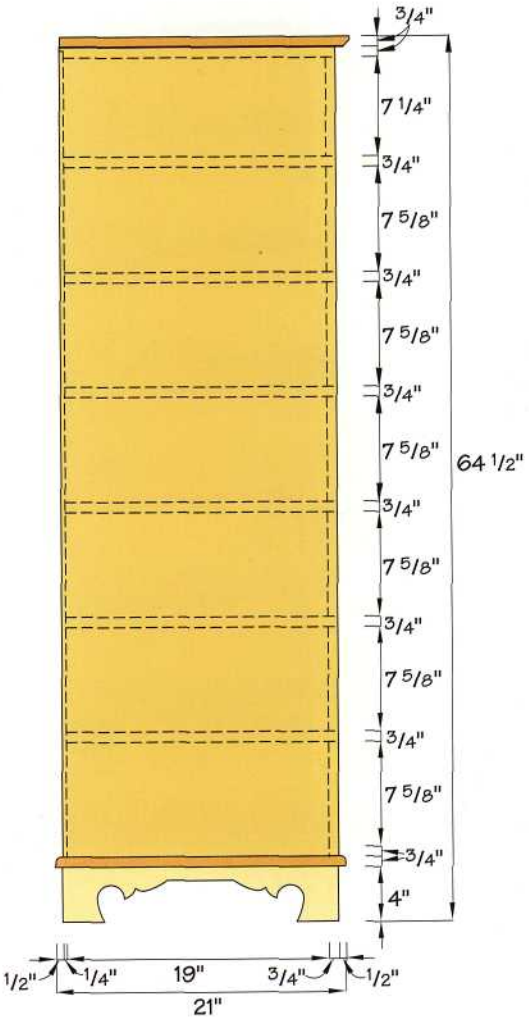
This is a substantial piece of furniture. It's bulky, heavy and difficult to maneuver. The carcass is of web frame construction with solid sides and top. The sides are stop-dadoed to receive the webs, and present a clean, unbroken front. The webs are offset for the same reason. The chest itself stands on feet attached to the bottom of the carcass. These are shaped, glued and then screwed in place from the underside of the one-piece bottom. The drawers are constructed using half-blind dovetail joints and fitted with period wooden knobs.



Top



Front



Side

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BUILDING THE CHEST

STEP 1. Cut all the pieces to size and run the edges through the jointer.

STEP 2. Build the boards that will make the sides, top and bottom.

STEP 3. Build the seven web frames (including one at the bottom to which the bottom board will be attached) as laid out in the drawing. You can use biscuits, as I did, or lap joints. Note the offsets, and that the top frame has an extra stretcher to carry the drawer separator.

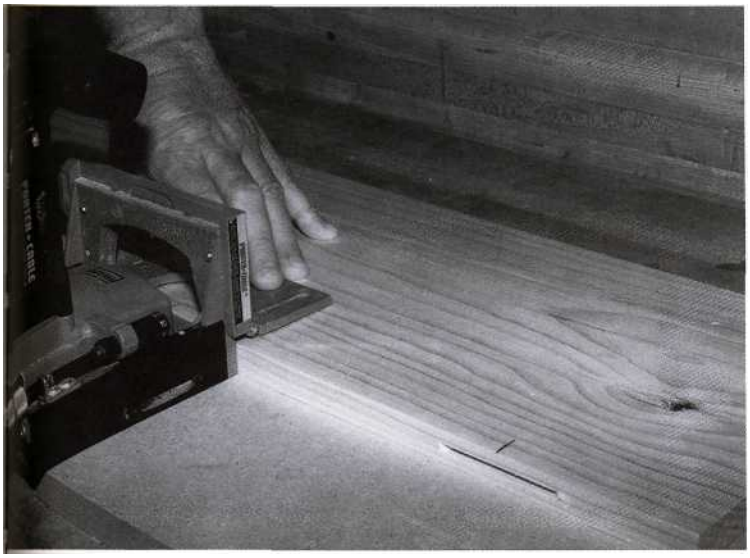
STEP 4. Mark the sides for stopped dadoes and top and bottom stopped rabbets as laid out in the drawing.

MATERIALS LIST

High Chest

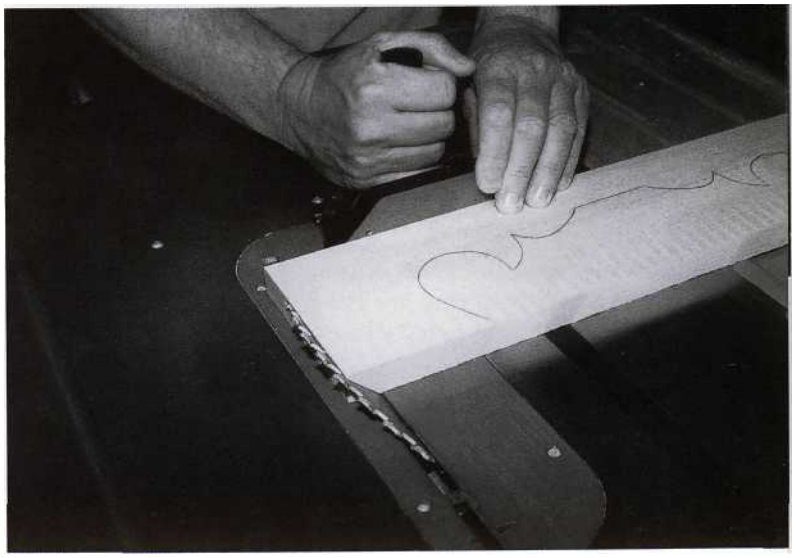
No.	*Letter*	*Item*	*Dimensions T W L*
1	A	Top	¾″ × 21″ × 41″
1	B	Bottom	¾″ × 21″ × 41″
2	C	Sides	¾″ × 20″ × 59″
1	D	*Back	¾″ × 39½″ × 60″
8	E	Webs	¾″ × 2½″ × 38½″
8	F	Webs	¾″ × 2½″ × 38″
18	G	Webs	¾″ × 4″ × 14¾″
1	H	Drawer Separator	¾″ × 5½″ × 19¾″
2	I	Feet	¾″ × 4″ × 41″
2	J	Feet	¾″ × 4″ × 20″
2	K	Drawer Fronts	¾″ × 5½″ × 18⅞″
2	L	Drawer Fronts	¾″ × 7⅞″ × 38½″
2	M	Drawer Sides	¾″ × 5½″ × 19¾″
2	N	Drawer Sides	¾″ × 7⅞″ × 19¾″
2	O	Drawer Backs	¾″ × 5″ × 19⅞″
2	P	Drawer Backs	¾″ × 7⅜″ × 38½″
2	Q	Drawer Bottoms	¼″ × 18½″ × 19½″
2	R	Drawer Bottoms	¼″ × 38″ × 19½″

*Overlaps slightly at the bottom



When you edge-join the pieces that make up the sides, mill your biscuit slots about 9" apart.

Use your router with a 3/4" bit and a T square to mill the stopped dadoes that will receive the top, bottom and web frames.



Cut the miters to the ends of the feet before you cut out the shapes.

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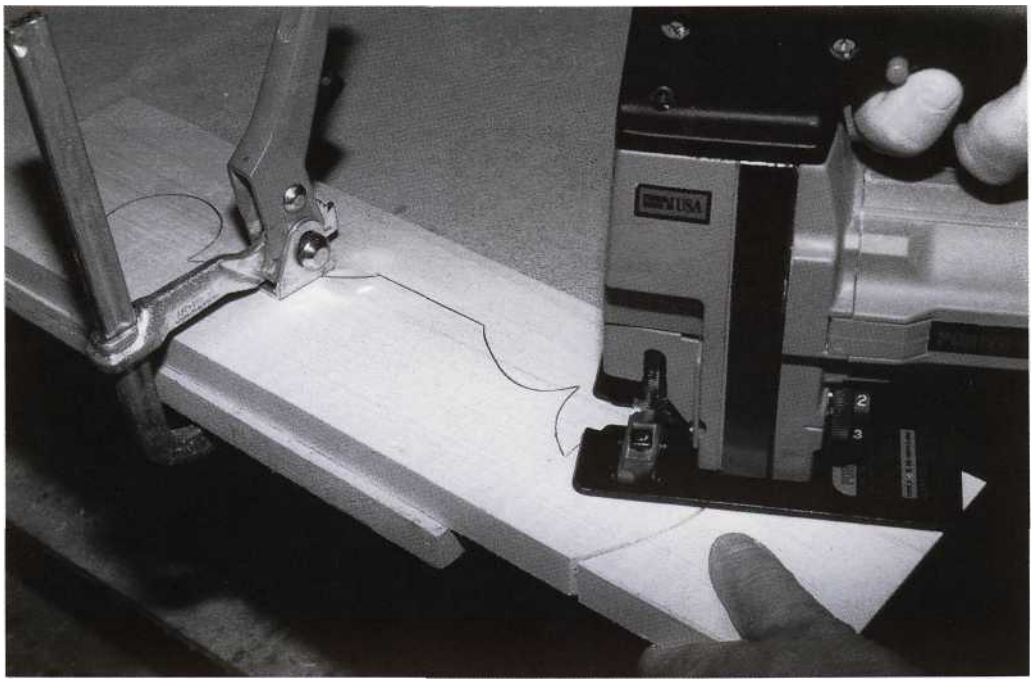
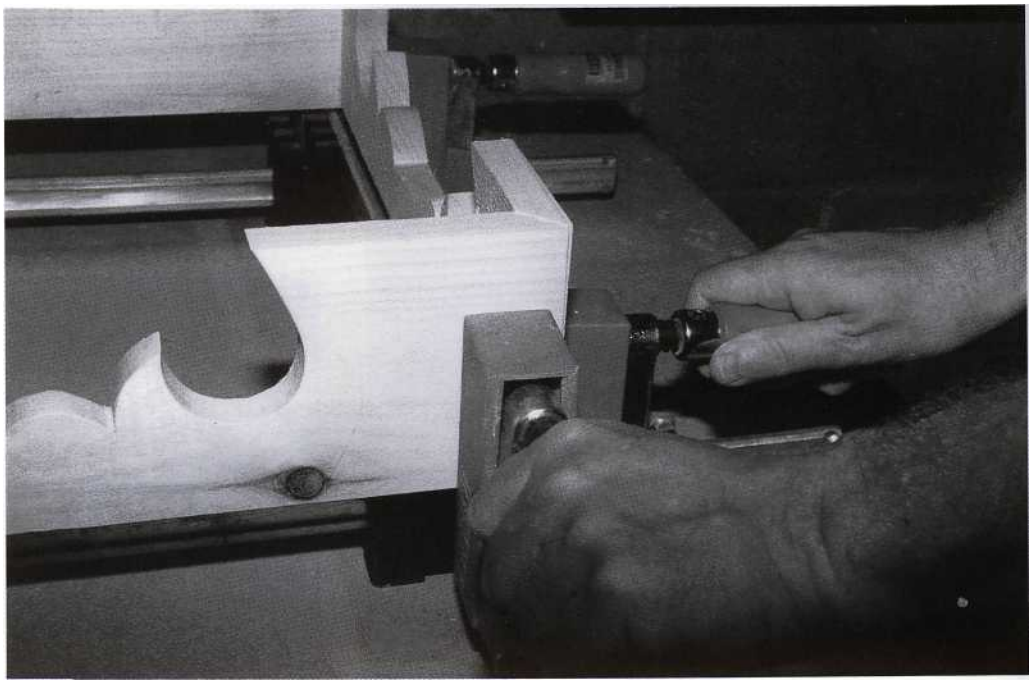


If you don't have a scroll saw, your jigsaw is the best tool for removing the waste from the feet sections.

Bessy's block and clamp system makes gluing and clamping mitered frames easy.



STEP 5. Mill the stopped dadoes and rabbets. I used my router, a 3/4" mortising bit and a T-square jig as described in the Shop Tip on page 123.

STEP 6. Mill 1/4"-deep rabbets to the inside back edges of both sides; these will receive the plywood back.

STEP 7. Glue, clamp and toenail the webs to the sides, making sure everything is square, and then set the structure aside until the glue is fully cured.

STEP 8. Glue and screw the drawer separator in place between the top and the top web frame as laid out in the drawing.

STEP 9. Set the carcass on the bottom board and fasten it in place using ten no. 6 X 1 5/8" screws: four at the back and front and one at each end. Be sure the heads do not protrude.

STEP 10. Use the scale pattern to mark the feet details.

STEP 11. Cut the miters to each end of the four pieces of stock that will make the feet.

Use a T square and your router equipped with a 3/4" mortising bit to mill the stopped dadoes in the sides.

STEP 12. Use your band saw or jigsaw to cut out the feet.

STEP 13. Glue and clamp the feet section together to form a frame, make sure the structure is square, then set it aside until the glue is fully cured.

STEP 14. Glue and screw the cleats to the upper inside edge of the feet section.

STEP 15. Turn the carcass upside down, set the feet section in place on the bottom board and then using ten no. 6 X 1 5/8" screws—four at the back and front and one at each end—attach it to the bottom board of the carcass.

STEP 16. Set your table saw to cut at an angle of 17° and a depth of 1 1/4" and cut the bevel to the three pieces of stock that will make the crown.

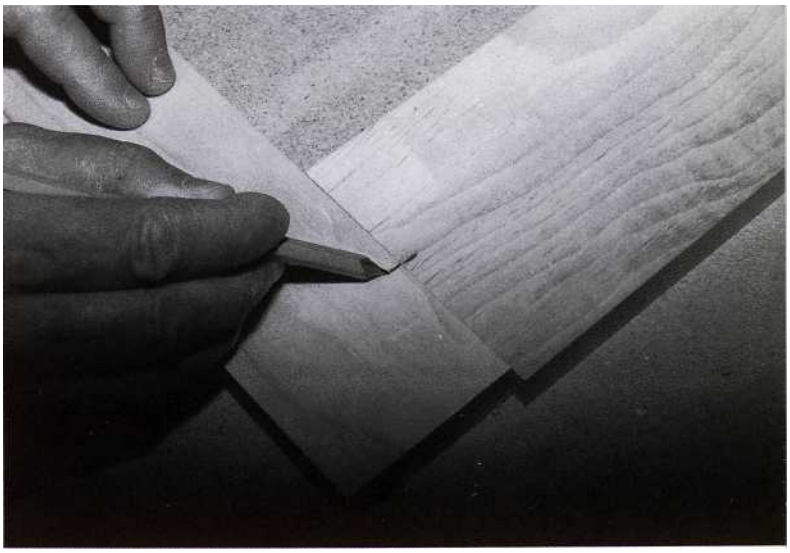
STEP 17. Cut the miters to the ends of the crown.

STEP 18. Glue the miters, set the crown in place and secure to the top of the carcass using ten no. 6 X *1 5/8"* screws: four along front and three at each end.

STEP 19. Make sure all the pieces for all eight drawers are exactly the right size, then, using half-blind and through dovetail joints, build the drawers.

STEP 20. Use small brads to attach the plywood back to the back of the unit.

STEP 21. Do some final sanding, then go on to the finishing process.



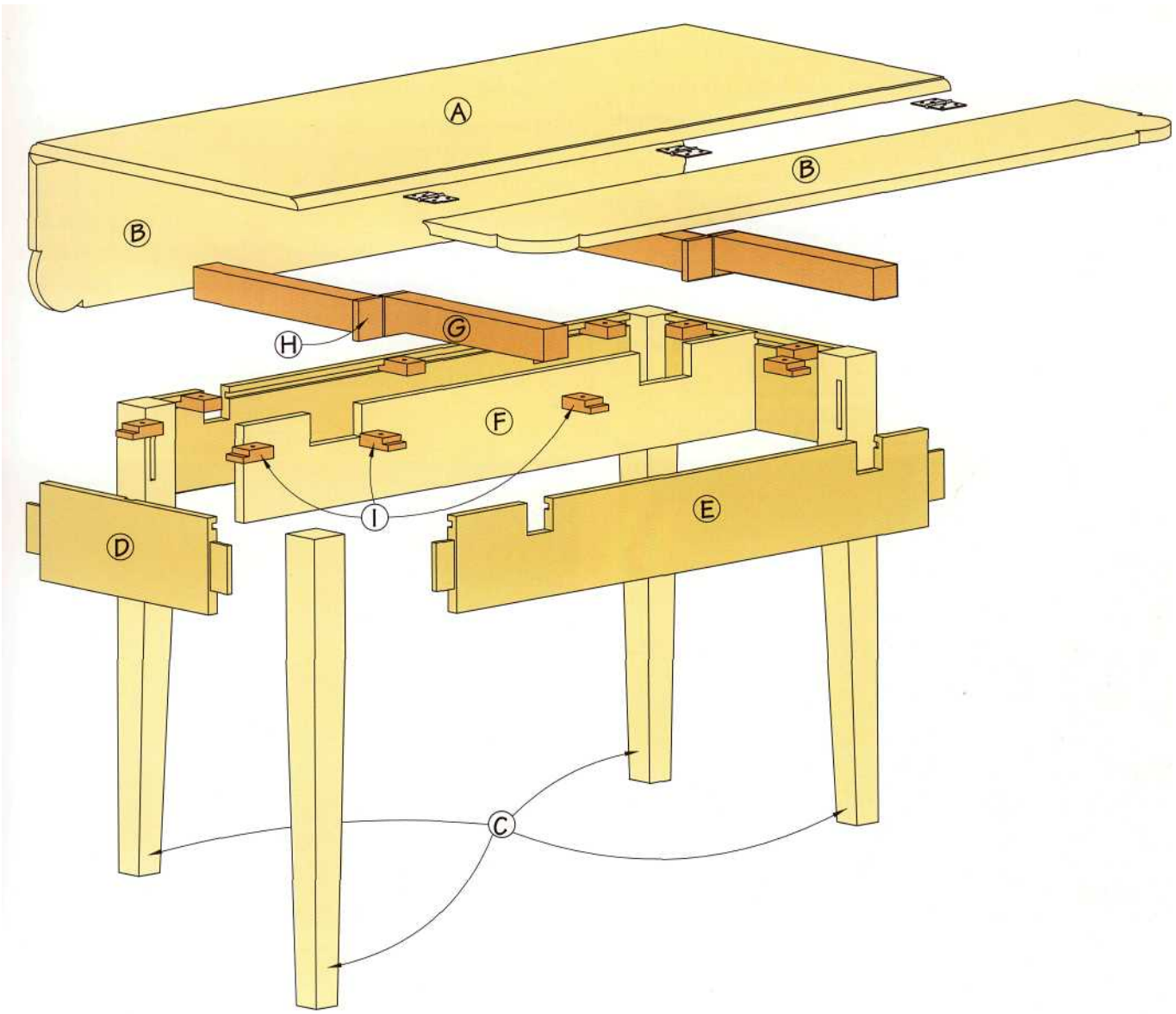
This photo illustrates how to mark the front components of the web frames for biscuit slots. Note the offset.

FINISHING

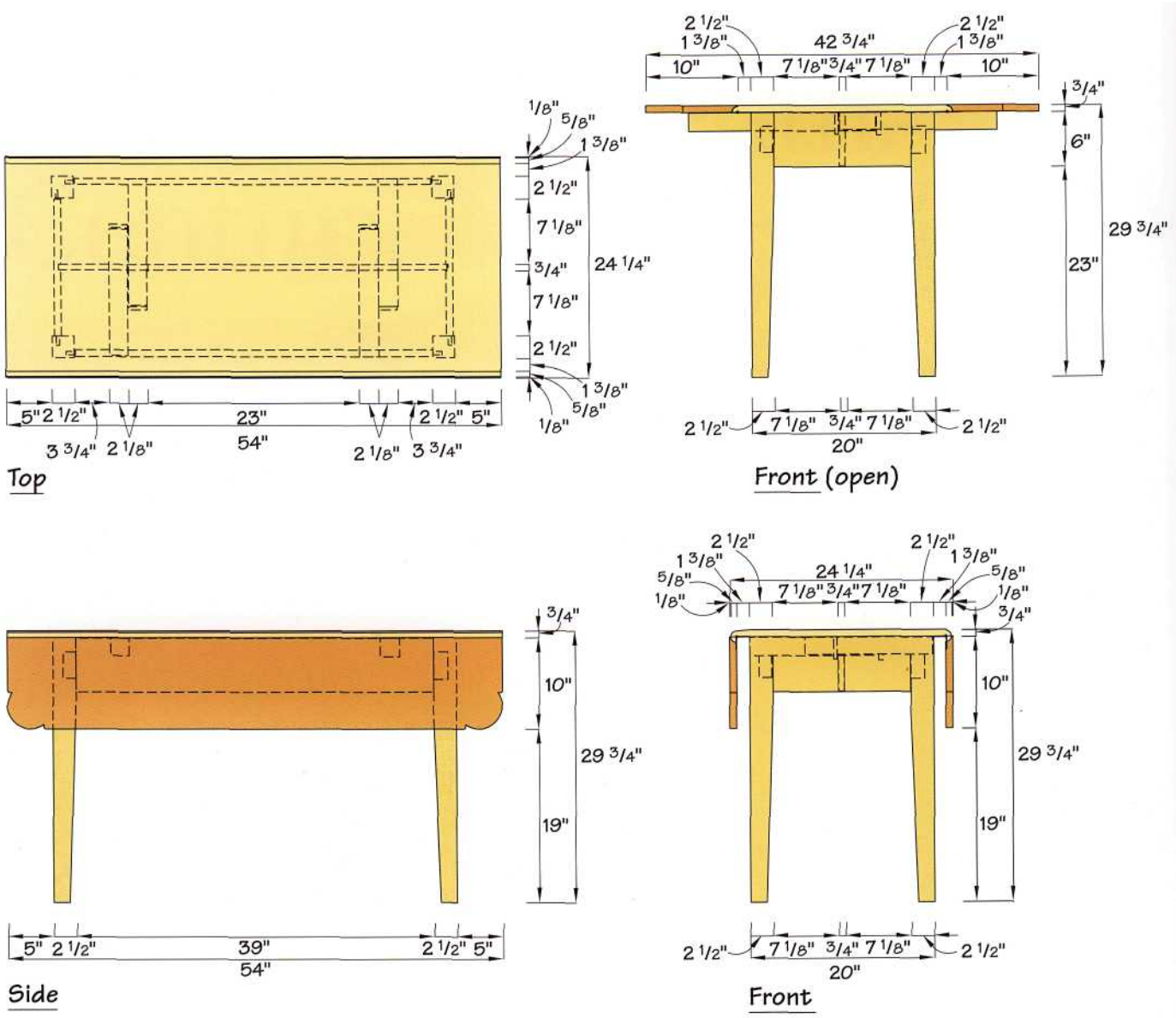
I did very little distressing on this piece on the advice of a good friend who owns a very upscale furniture store. Just a ding or two here and there seemed to be all that was required. For the stain I used tobacco juice. I applied several coats, allowing each one to dry thoroughly before applying the next, until I had the deep, dark color I was looking for. Next, I applied eight coats of buttonlac—it, too, has a dark color—sanding lightly between the coats. Finally, after a last wipe with 400-grit sandpaper, I applied two coats of beeswax and buffed to a shine.

Early Nineteenth-Century Harvest Table

The term harvest table usually designates a very long dining table with one or two drop leaves supported by swing-out or pullout brackets. They were made all over the United States, usually from pine, but many had a pine top and a hardwood understructure. They were somewhat primitive in style, essentially unfinished as opposed to the highly polished dining room-style tables, and would have been found in homes of type and class. But most were country pieces, farmhouse furniture. Tables like this also would have been used in kitchens, large and small, where the seating would have been benches rather than chairs. They came in all sizes from as small as 48" long to as large as 10'. Ours is 54"x 44" when fully extended. I chose this size so it would fit comfortably even in a small dining area. You'll enjoy having a piece like this in your home just as much as you'll enjoy making it. The construction was quite simple, and the early versions might or might not have had a rule joint between the leaves; ours, a copy of one made around 1820, does not. Few



old harvest tables have survived the centuries. Those that have are well worn and in poor shape. So this one will make a rare conversation piece and will be sure to raise a few eyebrows.



MATERIALS LIST

Harvest Table

No.	*Letter*	*Item*	*Dimensions T W L*
1	A	Top	¾″×24″×54″
2	B	Leaves	¾″×10″×54″
4	C	Legs	2½″×2½″×29″
2	D	Short Aprons	¾″×6″×18″
2	E	Long Aprons	¾″×6″×42″

No.	*Letter*	*Item*	*Dimensions T W L*
1	F	Leaf Support Carrier	¾″×6″×42½″
4	G	Leaf Supports	2″×2″×14″
4	H	Stops	½″×2″×2½″
10	I	Buttons	¾″×1½″×2″

Note: There is a ¼″ setback on the aprons from the outside of the legs.

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CONSTRUCTION OUTLINE

The top, 24" wide, is made from three pieces of furniture-grade pine a full 3/4" thick, the grain alternated for stability. Each of the two leaves is made from a single piece of stock, also 3/4" wide, which will provide a table-top 44" wide when fully extended. The legs, made from 10/4 stock, are slightly tapered. The apron is mortised and tenoned to the legs. The leaf supports are simple pullouts set into cutaways in the apron. The top is fastened to the apron with a series of buttons placed strategically around the upper inside of the understructure. There are no drawers. You should be able to finish it over a couple of weekends.

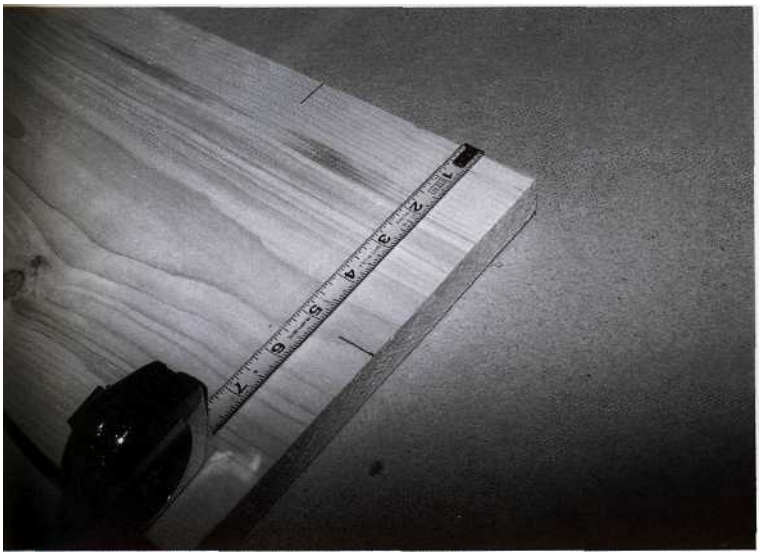
BUILDING THE TABLE

STEP 1. Cut all the pieces to size and run the edges through the jointer to ensure they are straight and square.

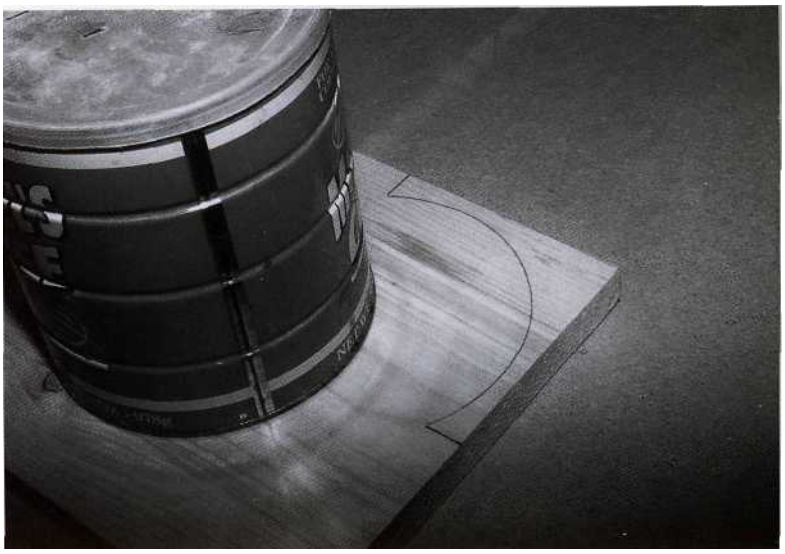
STEP 2. Build the board that will become the tabletop. You can use biscuits, as I did, or the more traditional dowels. Be sure to alternate the grain for stability.

STEP 3. Use the scale pattern and your jigsaw to cut the details to the corners of the leaves.

STEP 4. Use a 1/2" roundover bit in your router and round the upper edge of the ends of the top only, and the upper edge of the ends and outer edge of both leaves.

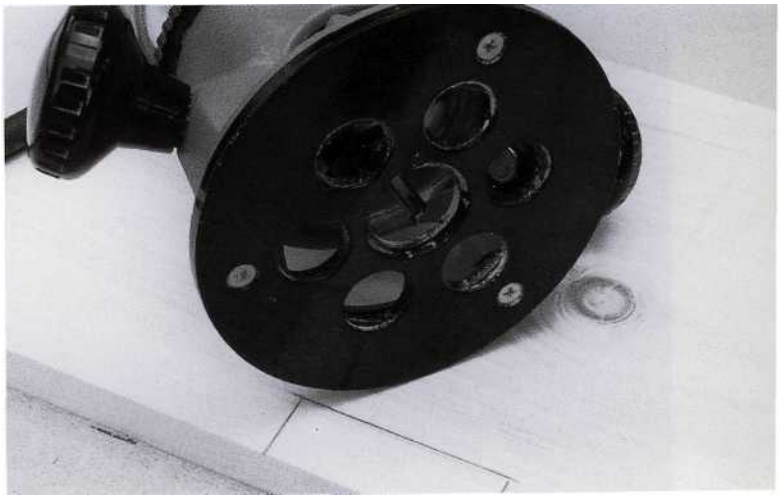


To begin working the detail at the ends of the leaves, on the underside at the outer edge of each end, scribe two lines 5" from the corners in both directions.



A three-pound coffee can is just the right size to use for marking the circle. Join the ends of two short, then use your jigsaw to remove the waste.

Use a 1/2" roundover bit to mill the outer edges of the two leaves and the ends of the tabletop.



Mark the position of the hinges on the underside of the top and leaves, score the outline with a utility knife, then remove the waste, freehand, with your router equipped with either a 1/4" or 5/16" straight bit.

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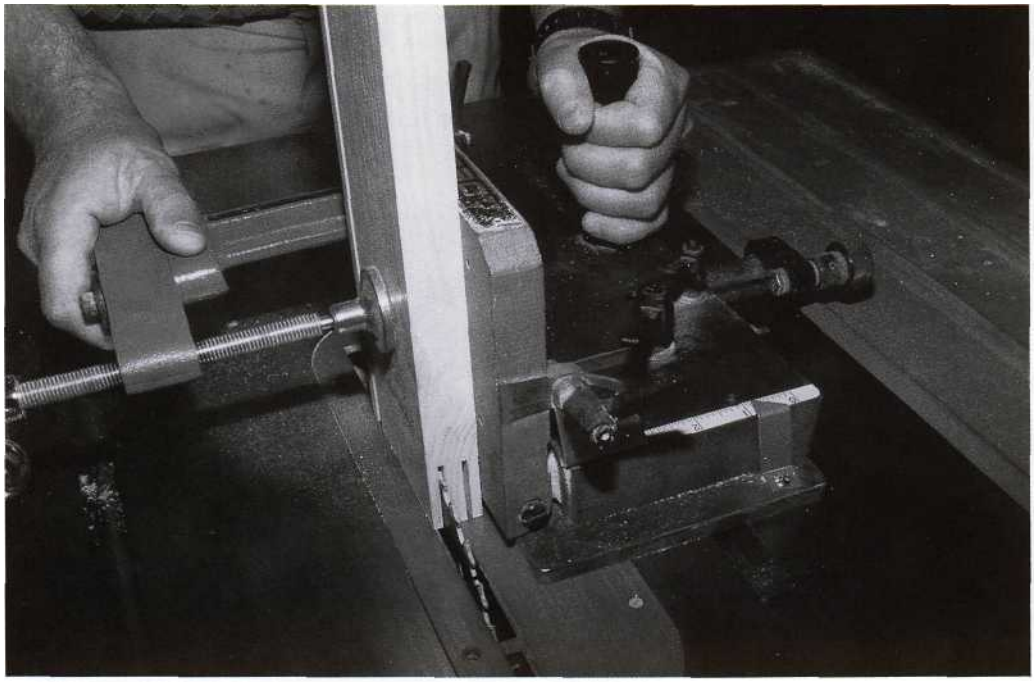


A tenoning jig makes short work of the joints at the ends of the apron, a sometimes tricky job. The results are consistent and accurate, but don't make the tenons until you've worked the mortises.

If your rip fence is movable, set it so that you can cut the shoulders of your tenons. If it's not movable, use a sacrifice fence attached to your rip fence.

STEP 5. Set your tapering jig to 2° and cut the tapers to the inside faces of all four legs. Leave the outside faces straight. Begin the taper 8" from the top of the leg, and make sure you have two left- and two right-hand legs.

STEP 6. Cut mortises 3" long x 1 1/2" deep x 3/8" wide to the inside faces of all four legs, again making sure you have two left- and two right-hand legs.

STEP 7. Mill the matching tenons to all four pieces that will make up the apron.

STEP 8. Dry fit the pieces to ensure everything is as it should be, then disassemble the pieces.

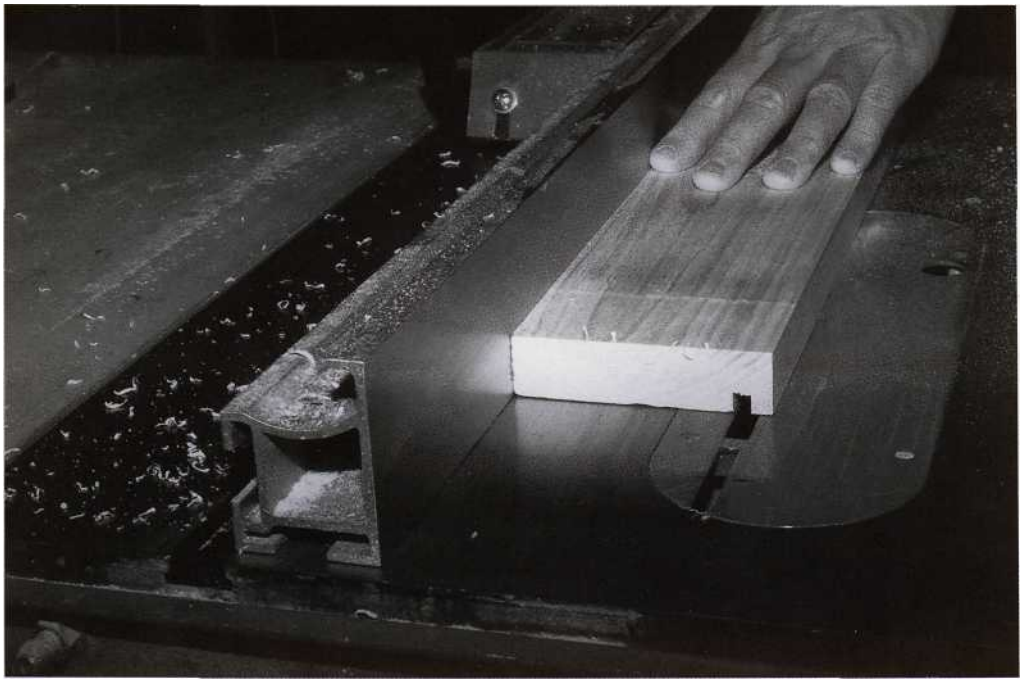
STEP 9. Mill the 3/8" slots to all four pieces of the apron that will receive the buttons to secure the top to the understructure.

STEP 10. Mill the dadoes in the inner faces of the two ends that will receive the leaf support carrier.

STEP 11. Mill the cutouts in the apron and carrier that will receive the leaf supports.

STEP 12. Sand all of the pieces smooth; do your distressing, to whatever degree suits you best, paying attention to the top, outer edges and corners, and to the bottom section of all four legs. Apply a coat of stain.

STEP 13. Glue, assemble and clamp the understructure—legs, apron and support carrier—and set aside overnight or until the glue is fully cured. I prefer to use one of the new polyurethane glues for this process.



Use your table saw equipped with a dado head to mill the button groove to the inner edge of the four rails that will make up the apron. If you don't have a dado head, you can use your regular blade, run the stock through once, and then move the rip fence and run it again.

STEP 14. Use no. 6 x 1 5/8" screws to fasten the stops to the ends of the pullout leaf supports.

STEP 15. Lay the top and leaves face down on the bench and mark the position of the mortises that will receive the hinges; use simple 3" brass butt hinges.

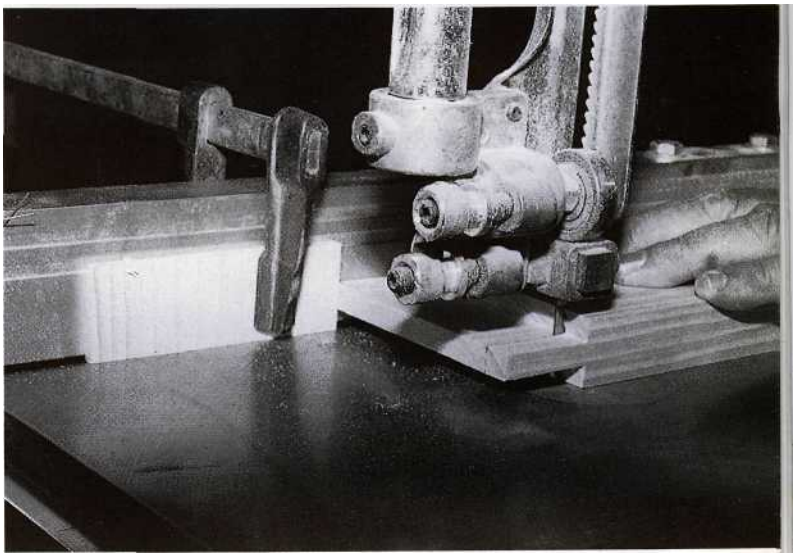
STEP 16. Use your router and a 1/4" straight bit to mill the mortises, or you can use a chisel if that suits you best, then screw the hinges in place; leave the top face down on the bench.

STEP 17. Go to the band saw and make ten buttons from the 2" X 1 1/2" X 3/4" pieces of stock laid out in the materials list, as per the drawing.

STEP 18. Set the understructure in place on the underside of the top—it should still be on the bench—and slip the four pullout leaf supports into place.

STEP 19. Use four buttons along each side and one at each end to fasten the top in place on the understructure.

STEP 20. Go to the finishing process.



For accuracy, you can use this setup on your band saw to cut the shoulders to the tenons of the rails that make up the apron. Set the rip fence in position, and then clamp your stop in position so that the blade of the saw just reaches the main body of the rail. If you don't have a rip fence, you can use a piece of scrap stock.

FINISHING

As this is supposed to be a simple farmhouse piece, finishing is minimal. An original, if not painted, would not have been finished at all. The pine would have been scrubbed and scrubbed over the years, would have suffered all sorts of abuse and would have taken on a deep, buttery yellow patina. So, as distressing is done purely to taste, I've only lightly distressed ours, and the finish is no more than a coat of Golden Pecan stain and a single wiping of antiquing glaze followed by a couple of coats of polyurethane for protection.

FEDERAL INLAID TABLE

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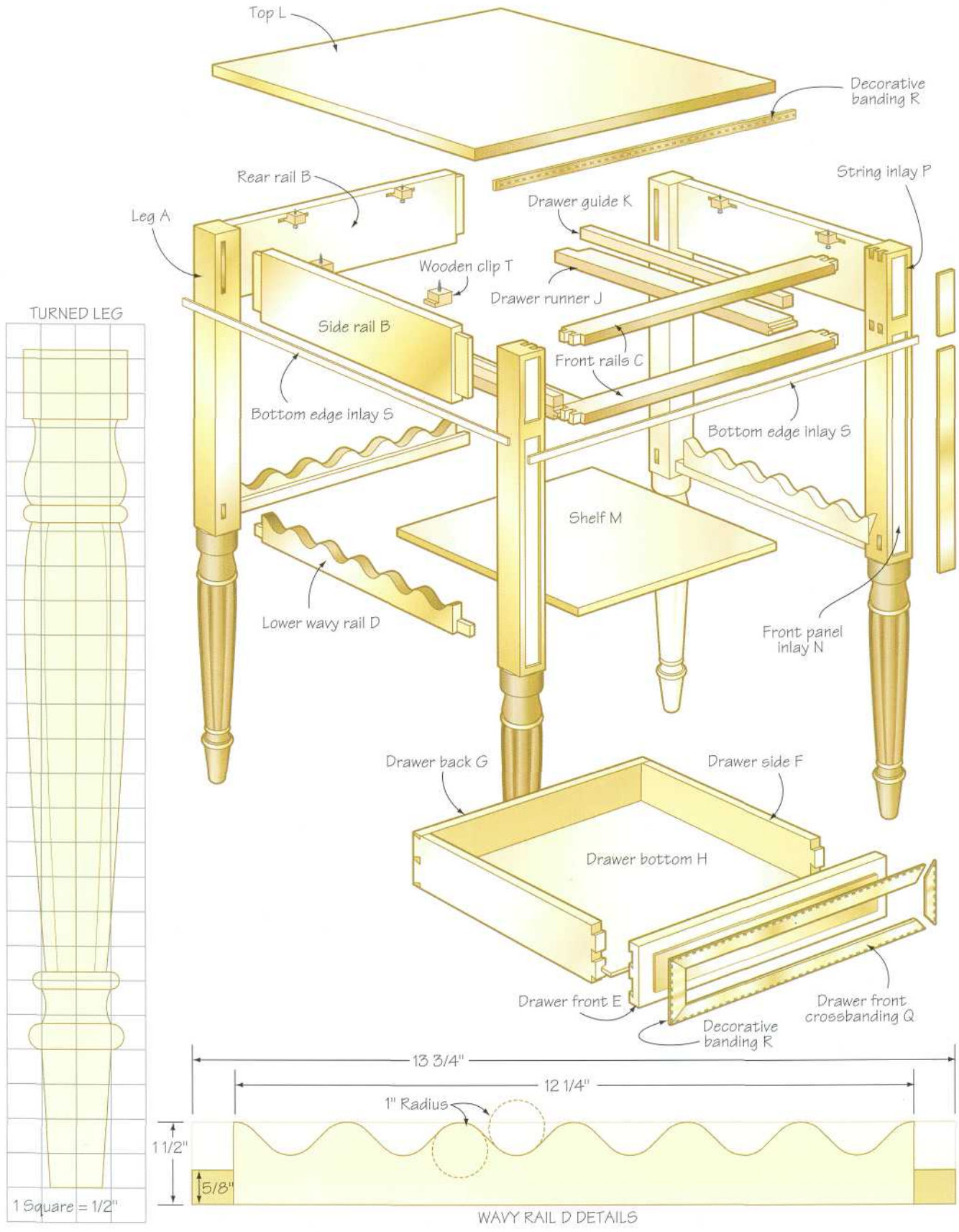

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FEDERAL INLAID TABLE

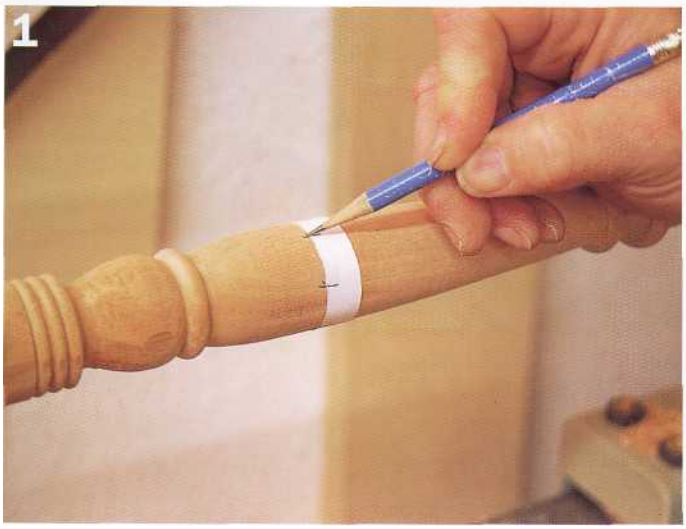
inches (millimeters)

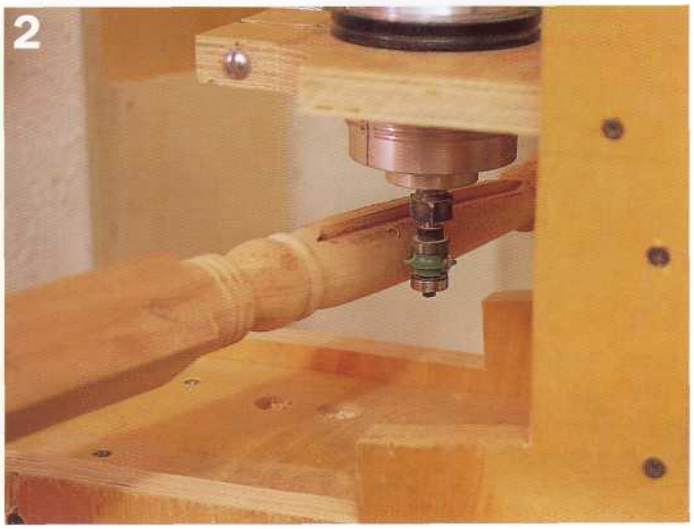
REFERENCE	QUANTITY	PART	STOCK	THICKNESS	(mm)	WIDTH	(mm)	LENGTH	(mm)	COMMENTS
A	4	legs	mahogany	1 1/2	(38)	1 1/2	(38)	27 1/8	(689)	
B	3	side and rear rails	mahogany	3/4	(19)	4 1/4	(108)	13 3/4	(349)	3/4" (19) TBE
C	2	front rails	mahogany	5/8	(16)	1 1/2	(38)	13 3/4	(349)	3/4" (19) TBE
D	4	lower wavy rails	mahogany	1/2	(13)	1 1/2	(38)	13 3/4	(349)	3/4" (19) TBE
E	1	drawer front	bird's-eye maple	7/8	(22)	3	(76)	12 3/16	(310)	
F	2	drawer sides	pine	7/16	(11)	3	(76)	13 5/8	(346)	
G	1	drawer back	pine	7/16	(11)	2 3/8	(61)	12 3/16	(310)	
H	1	drawer bottom	pine	1/2	(13)	11 3/4	(298)	13 5/8	(346)	
J	2	drawer runners	pine	5/8	(16)	1 5/8	(41)	13 1/4	(336)	3/8" (10) TOE
K	2	drawer guides	pine	5/8	(16)	3/4	(19)	12 1/8	(308)	
L	1	top	mahogany	3/4	(19)	16 1/2	(419)	16 3/4	(425)	
M	1	shelf	mahogany	1/2	(13)	14 3/4	(375)	14 3/4	(375)	
N	1	front panel inlay	bird's-eye maple	3/4	(19)	4	(102)	24	(610)	4 inlay pieces from board
P		string inlay	ebony	1/8	(3)	1/8	(3)	7 lf	(2134)	
Q		drawer front crossbanding	mahogany	3/16	(5)	3/4	(19)	3 lf	(914)	
R		Rockler inlay (dec. banding)				5/16	(8)	5 lf	(1524)	drawer and top (Rockler item #18812)
S		front and sides bttm edge inlay	tiger maple	3/16	(5)	1/4	(6)	4 lf	(1219)	
T	4	wooden clips	pine	1/2	(13)	7/8	(22)	4	(102)	

Note: TBE = tenon both ends; TOE = tenon one end.

hardware

2	1 1/2" (38mm) Antique-finish knobs with bolt fitting	item #H-46	Horton Brasses
	1 1/2" (38mm) Clout nails		
	Cyanoacrylate glue		
	Oil/varnish mixture		
	Paste wax		





Step 1 Begin by turning the lower portion of the legs according to the plan. To create the reeds, wrap a strip of paper around the turning at the largest diameter and mark the point where the paper overlaps. Remove the paper, trim to that mark, then lay out six equal spaces. Rewrap the paper in the same location and transfer the marks onto the turning. This is a simple method to divide a turning into equal sections.

step 2 The method that you use to cut the beads on this project depends on the lathe that you use. The jig I use is an L-shaped bracket that my trim router sets into. The bit is a Lee Valley beading bit. Adjust the point of the bit at the center of the turning or exactly at the center of the drive spur. Run the cut the length of the post, stopping before touching the bead at the top and bottom. From here, you will have to finish the carving by hand.

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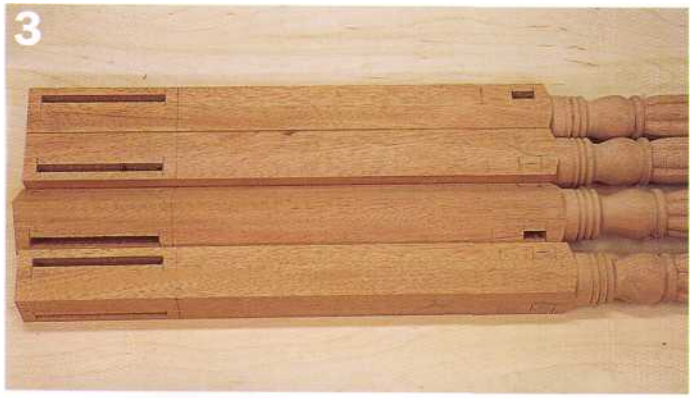
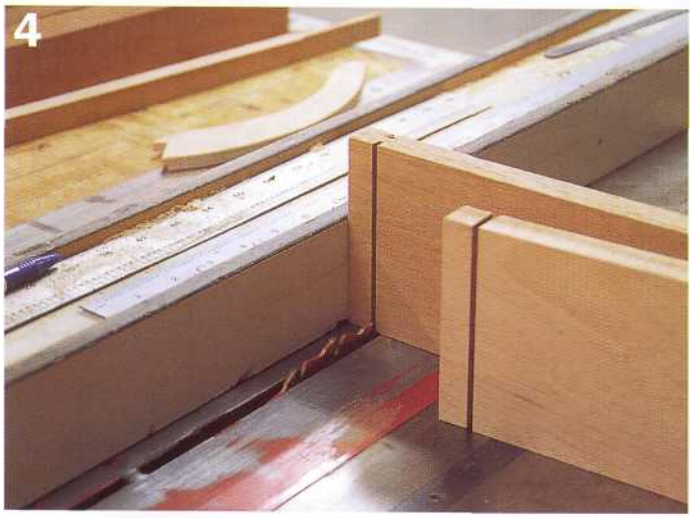
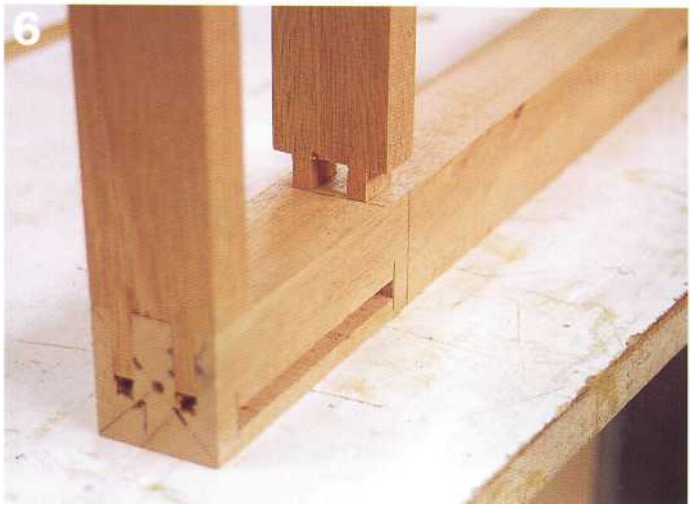


step 3 Mark and cut the mortises for all the rails. The front rail mortises are twin mortise and tenons (see step 6). You can also see the finished carving from the previous step.

step 4 Cut the tenons on the side and rear rails.

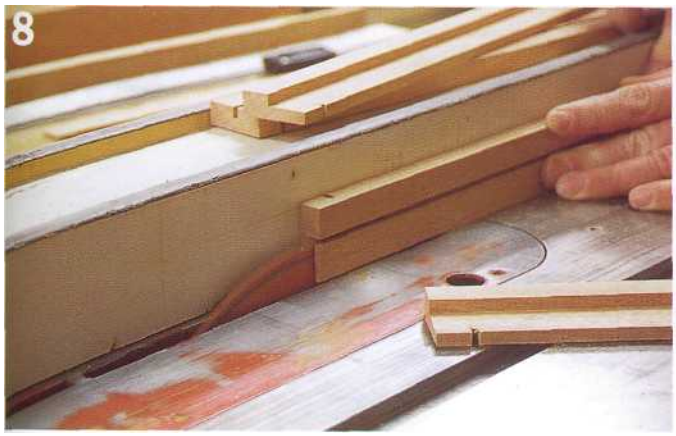
step 5 To create the twin tenon, make the shoulder cut on the 3/4" sides only. Using a tenoning jig, make the edge cut for both edges and reset the jig to remove the waste between the tenons.



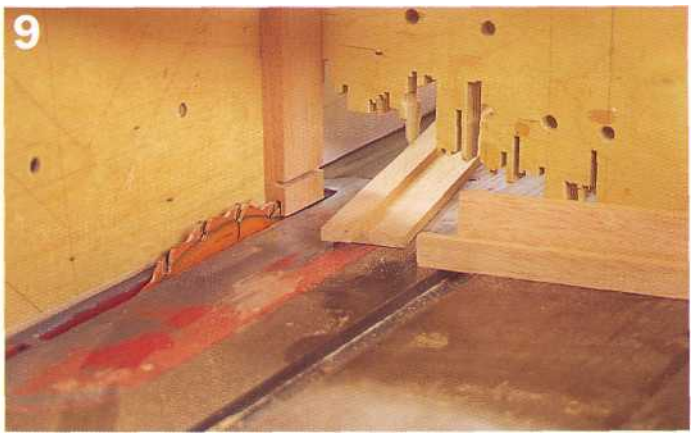


step 6 This is the finished twin mortise-and-tenon joint used for both front rails. Cut the mortises in the back edge of the bottom front rail to accept the drawer runner tenons.

step 7 For the wavy rails around the tray, begin with a 1/4" cut on the face of the piece, then make a second cut on the opposite face with the fence set 1/2" away from the blade.

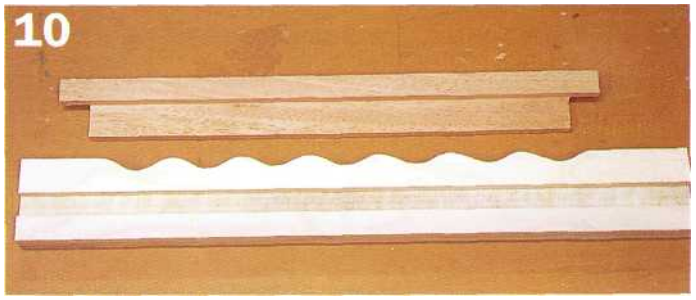


step 8 Reset the fence to 1/4", then raise the blade to remove the 7/8" waste up to the second cut made. This produces an L-shaped profile.



step 9 Finally, make the cheek cut that leaves the necessary tenon.

step 10 Make a pattern of the wavy design with a piece of 1/2" plywood. Cut a groove into the plywood so that the stock snugly fits into the groove.



step 11 Fit the stock into the groove, with the ends of the stock located at the top of a wave, and with a 1/4" beading bit set to the correct height, make the cut, creating the wavy design. You should make this a climb cut or move against the spin of the bit.

step 12 Assemble the table in steps. First, glue the side rails to the legs, then, when dry, glue the front and rear rails. Before you assemble the rear rail, cut the slots for the wood clips near the ends of the piece (see step 17).

step 13 Mill the shelf to size and make a 1/4" x 1/4" rabbet on all edges. Slide the piece into the area, allowing the front edge to rest against the back side of the front legs. Mark where the edge of the leg meets the shelf. Repeat this process on all four sides of the shelf. When complete, extend the marks to form the area that needs to be removed so that the shelf fits between the legs.

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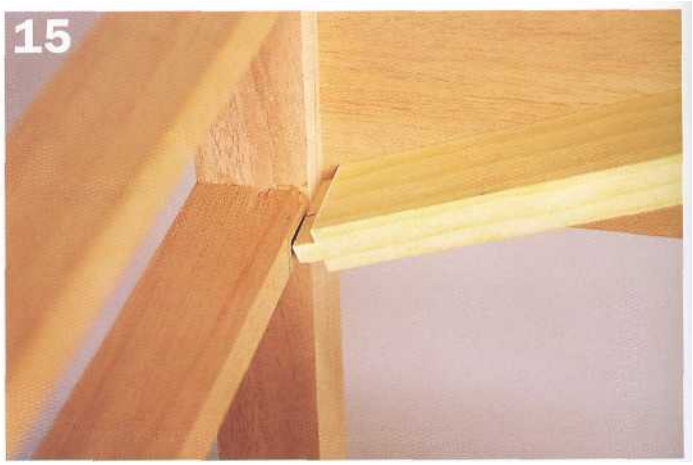


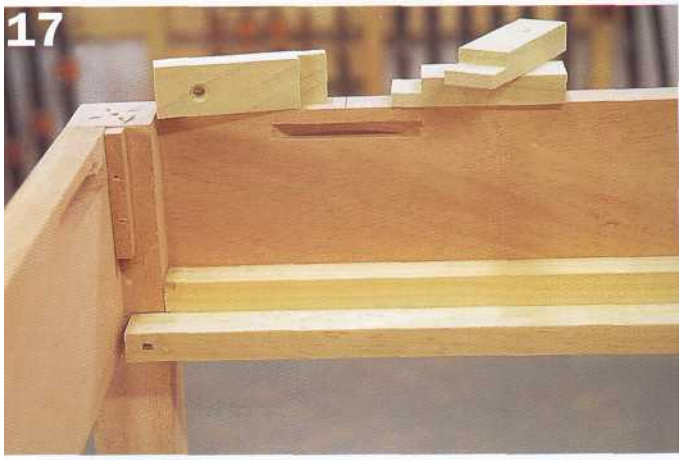
step 14 Make the cuts on the shelf and check the fit.

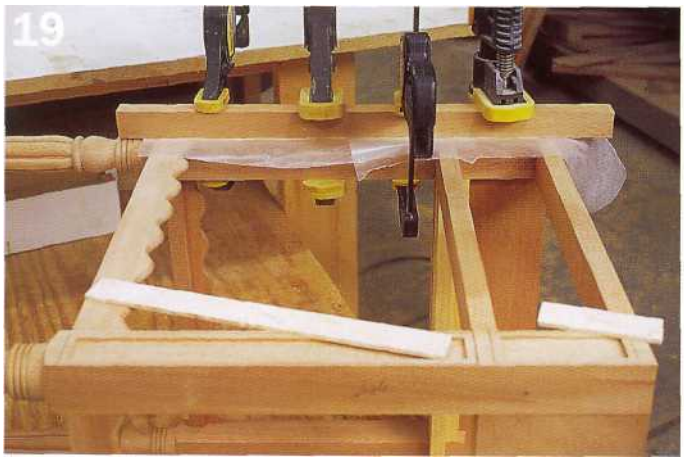
Step 15 Prepare the drawer runners and guides and make the tenon on one end of each runner. Remove the tenon at the front leg and cut a notch at the rear leg.

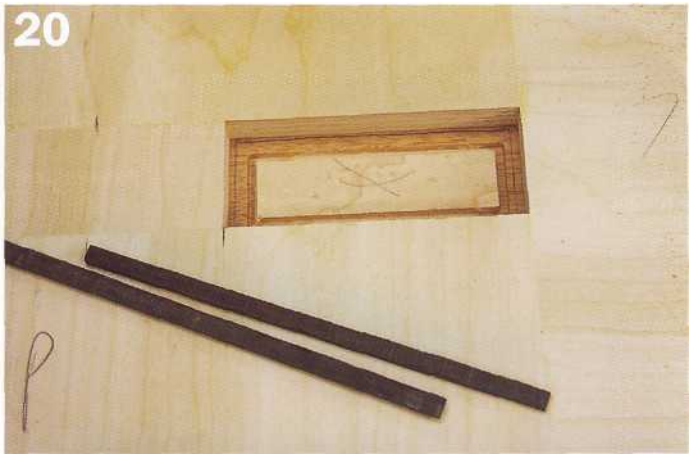
step 16 Glue the mortise and tenon, slide the runner into place, hold tightly to the front rail and nail into the rear post to secure. Glue and nail the drawer guide into place, even with the two posts.

Step 17 Use a biscuit joiner to cut the slots for the wooden clips. Set the cut to begin 1/4" down from the top edge. Cut a 1/4" slot. Make the wooden clips for the top. Secure with No 8 x 1" wood screws.

step 18 Make a jig for cutting the inlay by using 1/2" birch plywood and biscuit joinery. Remember to oversize the area to compensate for the inlay bushing. Mark the edges of the inlay jig carefully. Using the 1/8" bit, cut the leg for the inlay and remove the waste.



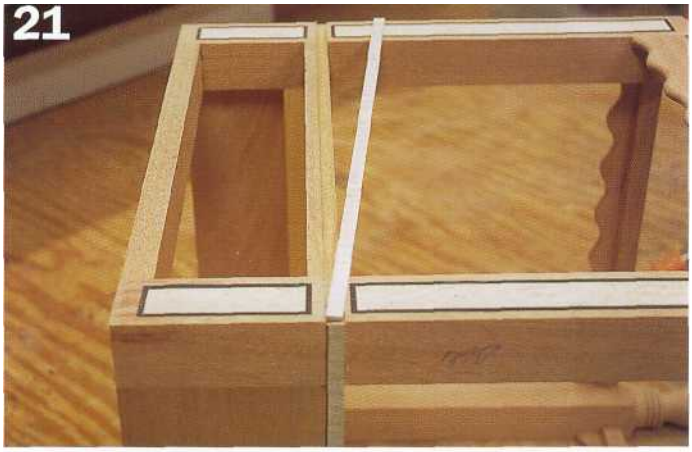


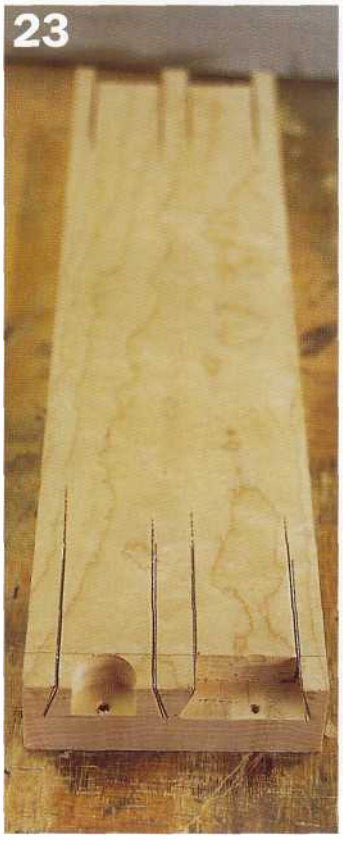


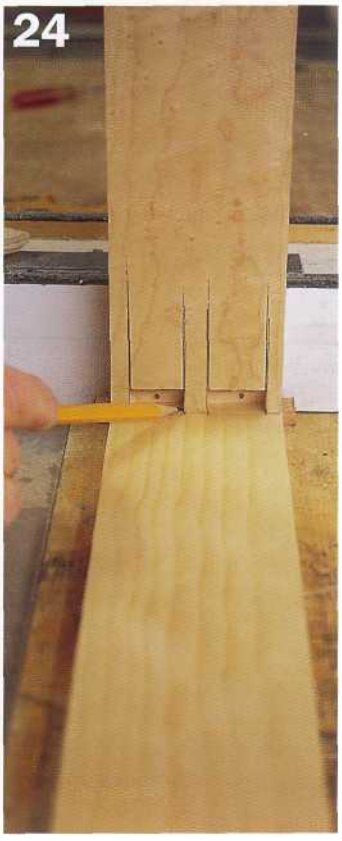
step 19 Following the directions with the inlay kit, cut the material for each of the front panel inlay areas and glue in place.

step 20 Place the jig back at the marks created in step 18. With the same setup, carefully cut a 1/8" groove around each inlay for the ebony string inlay. Mill the string inlay to size and glue. When dry, sand the inlay smooth.

Step 21 cut a ¼"-wide by 1/8"-deep groove on the front and both sides, even with the bottom edge of the rails. Cut an inlay of tiger maple to fill the groove and glue it in place, allowing the front to overlap the sides, hiding the ends of the inlay.



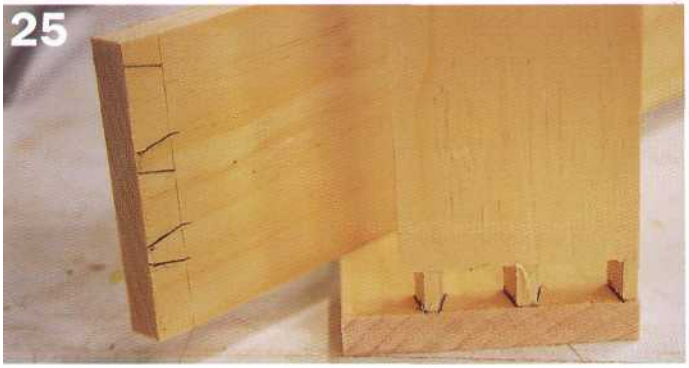


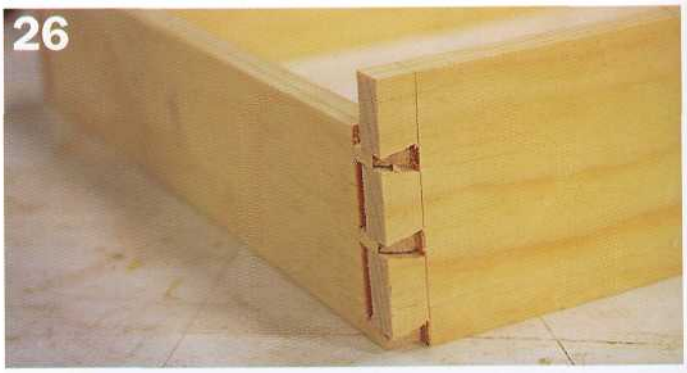


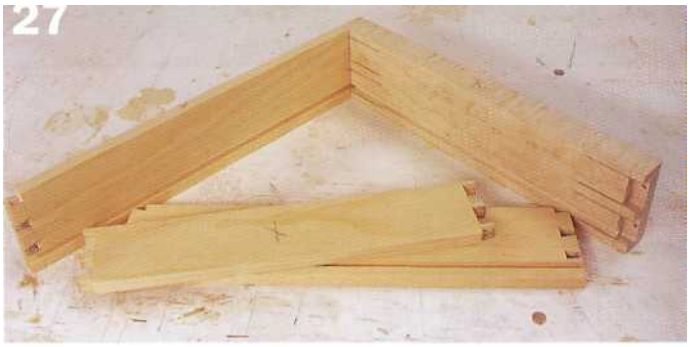
step 22 Build the drawer. Begin by laying out the dovetails on the drawer front. Cut the lines down to a line scribed 7/16" from the inside of the drawer front. Overcut toward the center of the interior face of the front. A front this size has two full tails, one pin and two half pins.

step 23 With a Forstner bit, cut away some of the waste, then clean the area with your chisels.

Step 24 Set the front onto a side piece with the inside even with a line scribed 7/16" from the end of the side and mark with a sharp pencil. Remove the waste area with the chisel and test the fit.





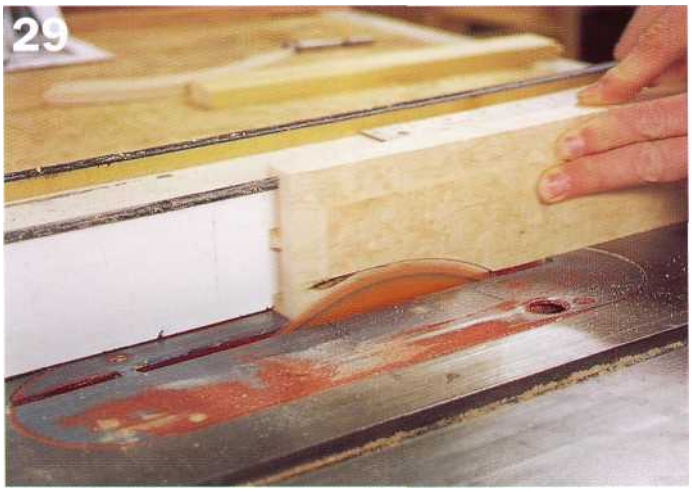


step 25 Lay out the back piece so there are two full pins and one half pin at the top. Cut those pins, removing the area of the tails. Set the back onto the side and transfer the marks from the back to the sides as shown. Then remove the waste, leaving the tails.

step 26 This is a look at how the side tails fit into the drawer back pins.

step 27 With the dovetails complete, cut a 1/4" groove that is half the thickness of the drawer sides for the bottom.

step 28 Cut the drawer bottom to size so the grain runs across the drawer and bevel three edges — the two end-grain ends and one other edge — to fit the groove. Make a 1/8" cut into the drawer bottom, just to the inside edge of the back piece.



step 29 With the drawer apart, set the saw blade to 3/4" and cut the front on all sides, creating the shoulder for the crossbanding.

step 30 Cut the crossbanding on the band saw, noticing the grain direction, and fit to the drawer front with mitered corners. Use cyanoacrylate glue to bond the banding to the drawer face.

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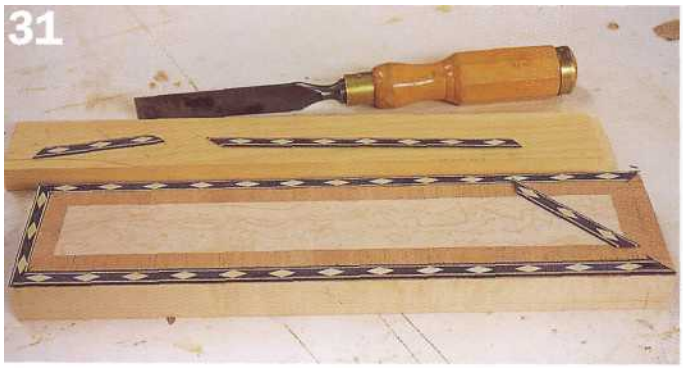
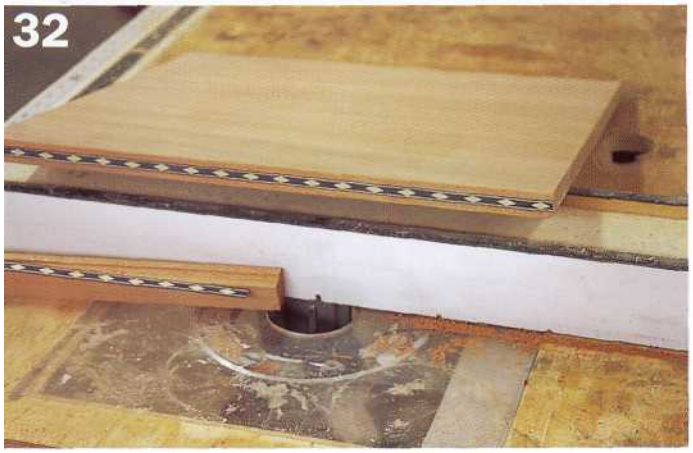


step 31 Repeat the process to install the decorative banding, as well.



step 32 With a 5/16" straight-cut bit in the router table, run the front edge of the top, creating the groove for the decorative inlay. Glue the strip in place.

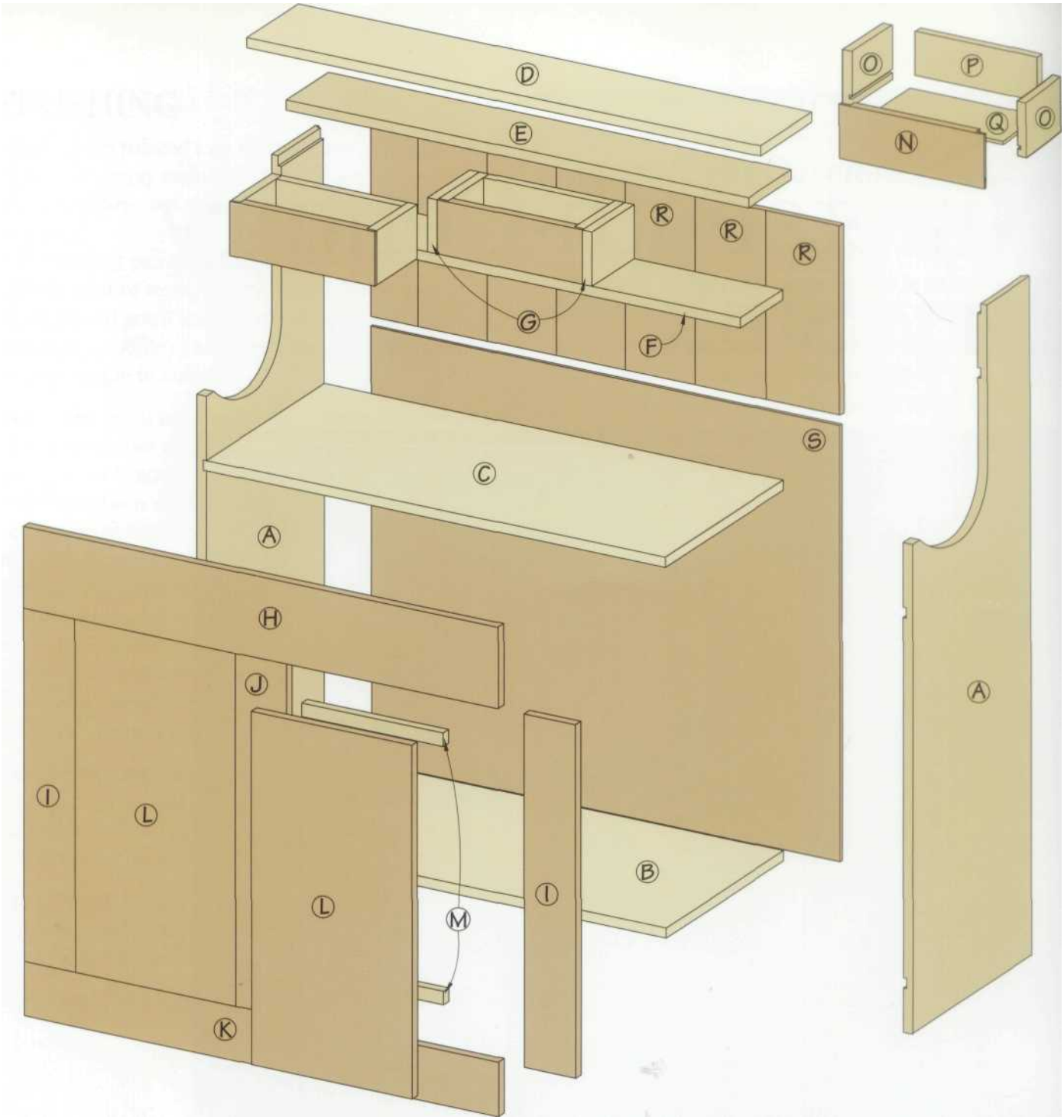
step 33 Sand the table completely, then you're ready to finish. The finish I use is an oil/varnish mixture. Three to four coats give a good sheen and protection. Then a coat of paste wax seals the deal.

step 34 Install the knobs by drilling the location with a 3/32" bit through the front. On the inside of the drawer front, drill a 5/8" hole 1/2" deep with a Forstner bit to recess the nut on the inside. Compete the process by redrilling the first hole with a 3/16" bit. Cut the knob shaft to size and attach the knob.

t i p To set the depth of the biscuit joiner, cut a scrap to the thickness necessary, set the piece against the blade that is extended, then bring the fence tight to that scrap. Make sure the tool is unplugged!

Nineteenth-Century Dry Sink

These pieces first came into use in the mid-eighteenth century. They were simple pieces found in the kitchens of country homes throughout America. They were used to hold water; a basin was simply placed in the well. Most incorporated a cupboard below and some even had drawers where towels and pots and pans and dishes were stored. Most of the early pieces were made from pine, but oak, poplar and maple



MATERIALS LIST

Low Dry Sink

No.	*Letter*	*Item*	*Dimensions T W L*
Material			
2	A	Stiles	¾″×2½″×29¾″
1	B	Center Stile	¾″×3″×31½″
1	C	Rail	¾″×2½″×36½″
2	D	Doors	¾″×14¼″×29½″
2	E	Ends	¾″×15¾″×34″
3	F	Shelves	¾″×15½″×35½″
1	G	Top	¾″×18″×38″

No.	*Letter*	*Item*	*Dimensions T W L*
2	H	Sink Ends	¾″×4½″×18″
1	I	Sink Front	¾″×5″×38″
1	J	Sink Back	¾″×4½″×36½″
1	K	Sink Top	¾″×4½″×38″
3	L	End Base	¾″×3½″×18″
3	M	Front and Back Base	¾″×3½″×36″
3	N	Back	¼″×36″×34″

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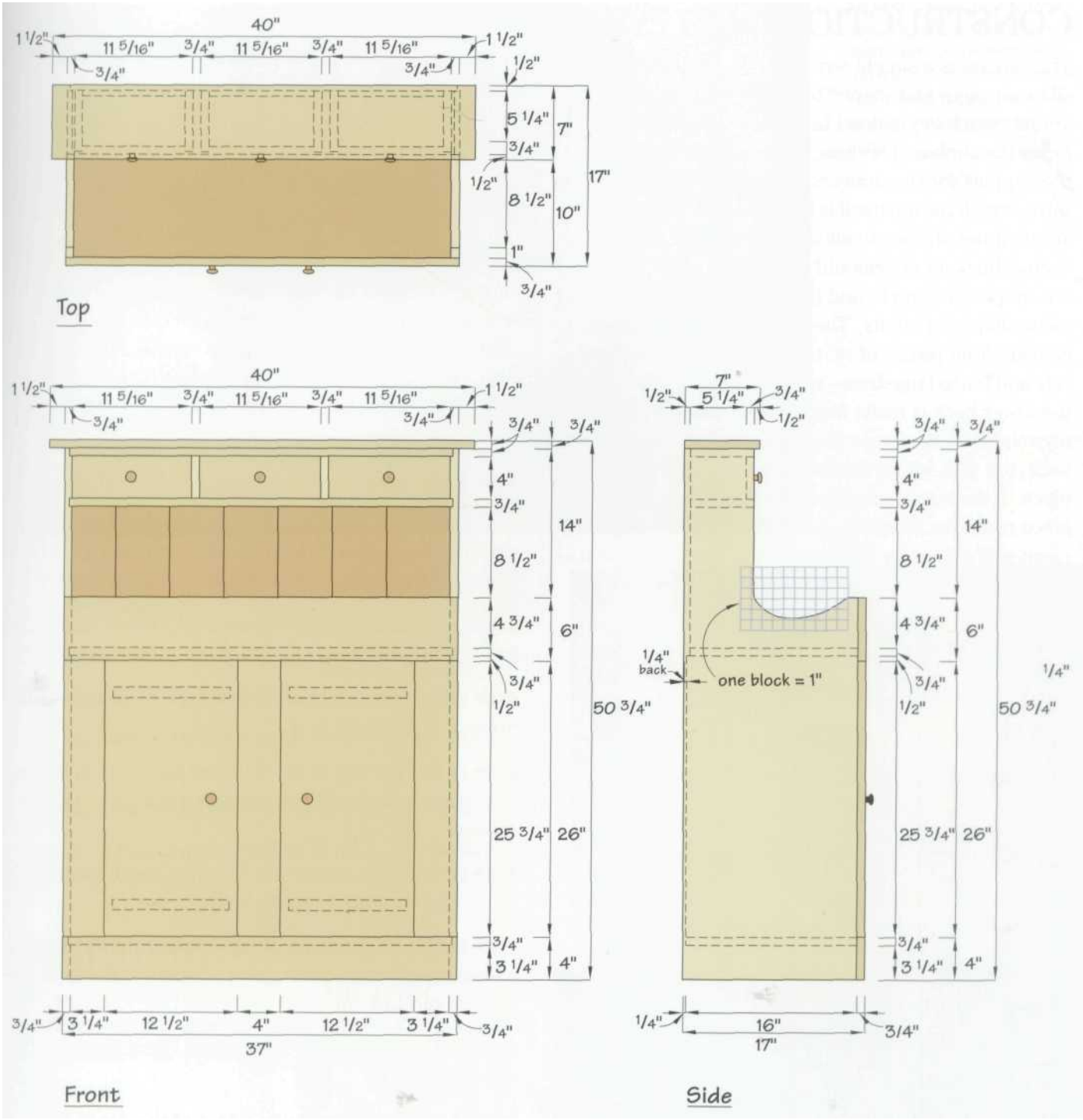


were also used. Most were painted in dark colors—green, black or brown. Many were left unfinished, scrubbed and rescrubbed over the years. Today, they are enjoying a new popularity due very much to the country crafting community.

The dry sink I've chosen for this book is an attractive piece, simple in design and easy enough to make over a weekend. The period? I'm not sure. I found the original, an authentic antique, illustrated in a book on antique American furniture. It wasn't dated, but I estimate it must have been made during the early part of the nineteenth century.

CONSTRUCTION OUTLINE

The carcass is a simple structure. The sides are made all in one piece and shaped to form the top section. They arc rabbeted and dadoed to accept a single shelf that forms the cupboard bottom, the bottom of the sink area, the support for the drawers above the sink and a false top to which the top itself is fastened with screws. There are no inner shelves to allow for storage of large items such as buckets, churns and other containers. The doors arc simple flat panels, and the drawers are constructed using simple lap joints. The back of the upper section is made from pieces of 1/2-thick stock, edged on one side and butted together—no tongue-and-groove joints; the lower back is made from a single piece of 1/4″ lauan plywood. You could use lauan plywood for all of the back, but that would destroy the antique look of the piece. A dedicated weekend of work should see the piece ready for finishing. As to finishing, the original piece was extremely attractive—that's why I chose it— and 1 saw no reason to change the look.

BUILDING THE DRY SINK

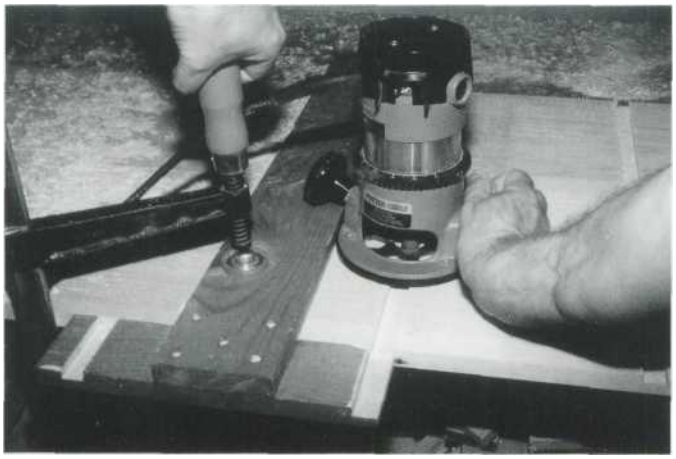
STEP 1. Cut all the pieces to size.

STEP 2. Build the two boards that will form the sides.

STEP 3. Build the two boards that will form the bottom of the cupboard and the bottom of the sink area.

STEP 4. Build the two boards that will form the doors.

STEP 5. Cut the sides to shape as per the drawing. It's best to use a handheld jigsaw for this process.



When you mill the dado to the sides, you can use either your radial arm saw or a router with a 3/4" bit. If you use both the router and the T square, you'll find it easier to make matching cuts if you clamp both sides together and run the router over both pieces.

STEP 6. Sand all the pieces smooth.

STEP 7. Mill the dadoes in the sides as per the drawing. Make sure you have a left and a right.

STEP 8. Glue, toenail and clamp the cupboard bottom. sink bottom, drawer support, and false top to the dadoes and rabbet in the sides, and set the structure aside until the glue is fully cured.

STEP 9. There are several ways to attach the trim to the carcass. You can glue, nail and clamp as I did, and as was done on the original, or you can biscuit them on. I believe, because the original was a simple country structure, the way to go is to use nails and fill the holes. They'll still show, but that's good and adds to the overall look of the piece.

STEP 10. Glue, nail and clamp the Front of the sink area to the carcass.

STEP 11. Glue, nail and clamp the side trim and the center trim to the carcass.

STEP 12. Toenail the side trim and the center trim to the front of the sink area.

STEP 13. Set the nail heads and fill the holes with wood putty.

STEP 14. Set the top in place on the false lop and, from underneath, fasten the two together with no. 6 x 1 5/8" screws.

STEP 15. Use glue and screws to fasten the drawer dividers in place; plug the screw holes.

STEP 16. Use 3/4" stock *4 1/2" X* 18"—or assorted widths for a pleasing effect—and no. 6 X 1 1/2" screws, and form the ends of the sink top.

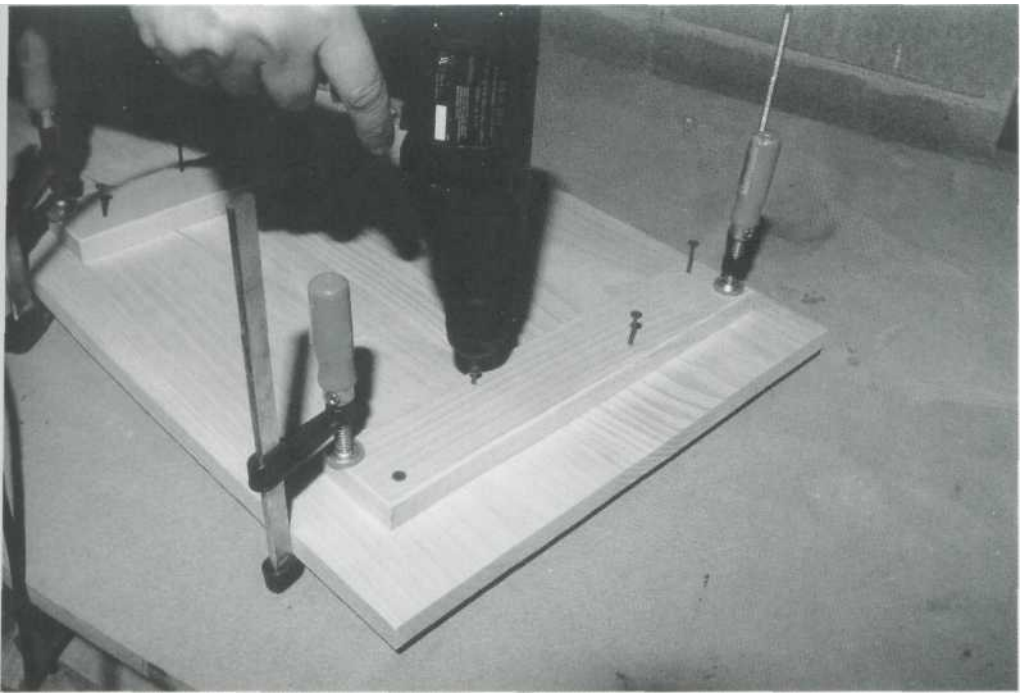
STEP 17. Fit the doors to the carcass. Trim for a good fit as necessary.

STEP 18. Cut mortises in the edges of the doors and frames to receive brass butt hinges. Do not, attach the doors yet.

STEP 19. Cut and sand the two swivel cat catches as you see in the drawing.

STEP 20. Build the three small drawers using simple lap joints and cut-steel nails.

STEP 21. For a really authentic look, resaw some narrow stock to make 1/4″ boards to form the bottoms of the drawers.



To prevent the doors from warping, screw and glue cleats across the widths of the backs. For doors this size, you'll need three cleats, one at each end and one in the middle.

STEP 22. Do any necessary finish sanding and break all the sharp edges.

STEP 23. Go to the finishing process below.

STEP 24. Attach the doors to the carcass.

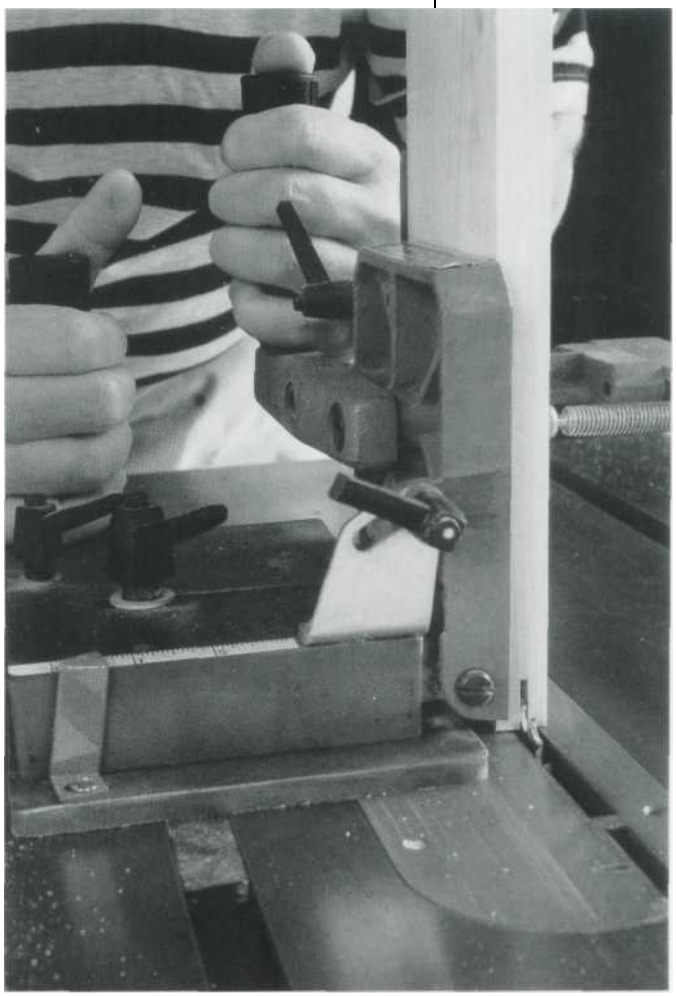
STEP 25. Attach the lower back to the carcass using 1" brads.

STEP 26. Attach the hardware to the doors and drawers.

STEP 27. Set the swivel catches in place and fasten with no. 6 x 1 5/8" screws**.**

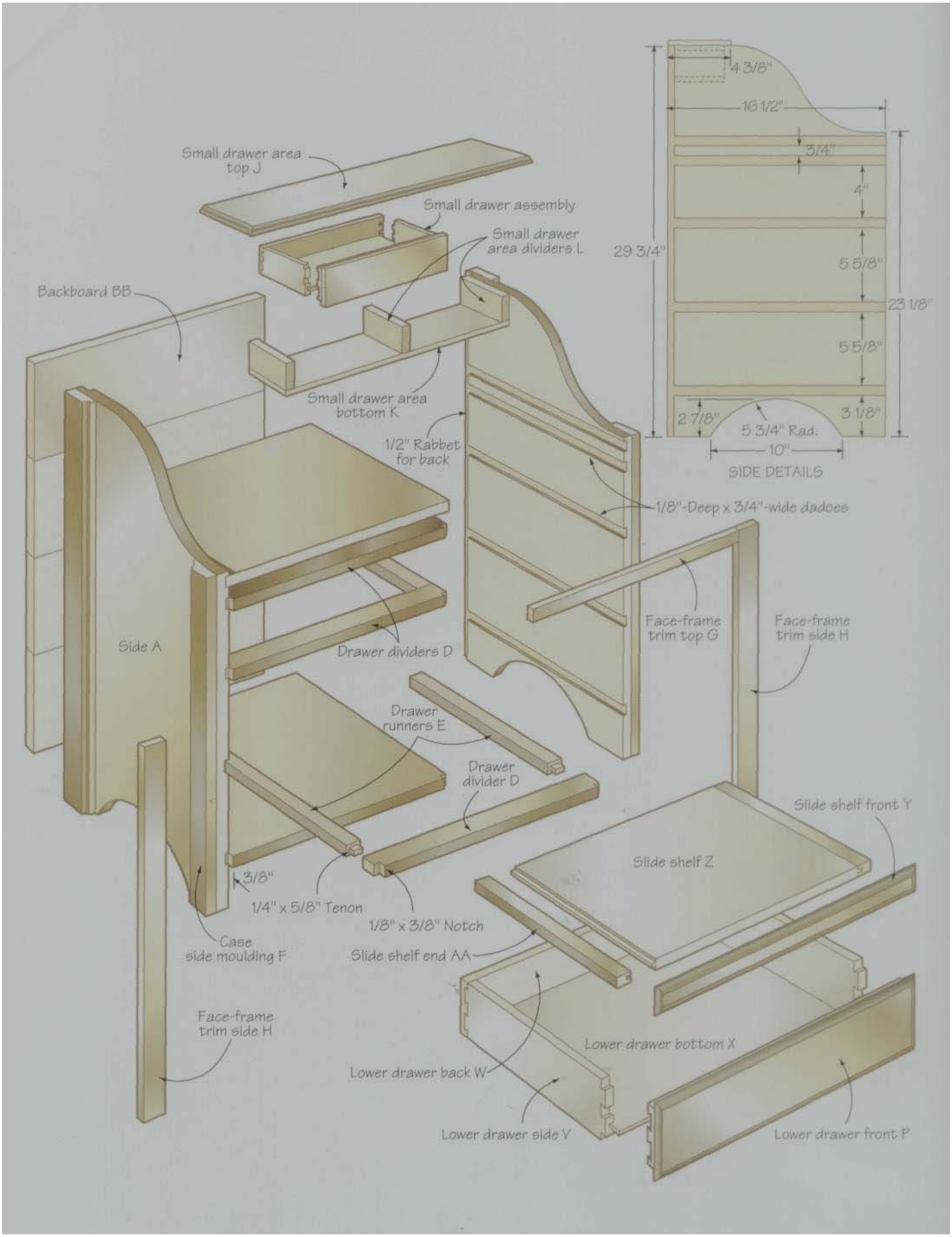
FINISHING

No secrets here other than the stain. I chose tobacco juice and then finished it with a couple of coats of satin polyurethane for protection.



As always, you'll find your tenoning jig is the best tool for forming the rabbets to the drawer fronts.

SHAKER SMALL CHEST OF DRAWERS



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SHAKER SMALL CHEST OF DRAWERS

inches (millimeters)

REFERENCE	QUANTITY	PART	STOCK	THICKNESS	(mm)	WIDTH	(mm)	LENGTH	(mm)	COMMENTS
A	2	side panels	cherry	9/16	(14)	16 1/8	(409)	29 3/4	(756)	
B	1	top panel	cherry	3/4	(19)	15 1/2	(394)	20 7/8	(530)	
C	1	bottom panel	pine	3/4	(19)	15 7/8	(403)	20 7/8	(530)	strip of cherry at front edge
D	3	drawer dividers	cherry	3/4	(19)	1 3/4	(45)	20 7/8	(530)	
E	6	drawer runners	pine	3/4	(19)	1	(25)	14 1/2	(369)	1/2" (13) TOE
F	4	case side mouldings	cherry	3/8	(10)	2	(51)	30	(762)	
G	1	face-frame trim top	cherry	3/8	(10)	1	(25)	20 9/16	(522)	
H	2	face-frame trim sides	cherry	3/8	(10)	1	(25)	23 1/8	(587)	
J	1	small drawer area top	cherry	9/16	(14)	4 3/8	(112)	22 3/4	(578)	moulded three sides
K	1	small drawer area bottom	cherry	9/16	(14)	3 3/4	(95)	20 9/16	(522)	
L	3	small drawer area dividers	cherry	3/4	(19)	3 3/4	(95)	2	(51)	
M	2	top drawer fronts	cherry	13/16	(21)	2 3/16	(56)	9 1/2	(242)	5/16" (8) rabbet three sides
N	1	upper drawer front	cherry	13/16	(21)	4 3/16	(107)	21	(533)	5/16" (8) rabbet three sides
P	2	lower drawer fronts	cherry	13/16	(21)	5 7/8	(149)	21	(533)	5/16" (8) rabbet three sides
Q	4	top drawer sides	pine	3/8	(10)	1 15/16	(49)	3	(76)	
R	2	top drawer backs	pine	3/8	(10)	1 7/16	(36)	8 15/16	(227)	
S	2	top drawer bottoms	pine	1/4	(6)	2 3/4	(70)	8 9/16	(217)	
T	2	upper drawer sides	pine	1/2	(13)	3 7/8	(98)	14 1/2	(369)	
U	1	upper drawer back	pine	1/2	(13)	3 1/8	(79)	20 1/2	(521)	
V	4	lower drawer sides	pine	1/2	(13)	5 1/2	(140)	14 1/2	(369)	
W	2	lower drawer backs	pine	1/2	(13)	4 3/4	(121)	14 1/2	(369)	
X	3	drawer bottoms	pine	5/8	(16)	15	(381)	20	(508)	
Y	1	slide shelf front	cherry	5/16	(8)	1	(25)	21	(533)	
Z	1	slide shelf	pine	3/4	(19)	15 1/2	(394)	19 1/2	(496)	1/4" (6) TBE
AA	2	slide shelf ends	cherry	3/4	(19)	1	(25)	15 1/2	(394)	
BB	1	backboard		1/2	(13)	21 3/16	(538)	29	(737)	made from various pieces

Note: TOE = tenon one end; TBE = tenon both ends.

hardware

3	1 1/2" (38mm) Cherry wooden knobs for lower drawers	item #61692	Rockler
2	1" (25mm) Cherry wooden knobs for upper drawers	item #61665	Rockler
2	1/2"-dia. (13mm-dia.) Brass knobs with antique finish	item #H-42	Horton Brasses
	1 1/2" (38mm) Fine finish nails	item #N-5	Horton Brasses
	J.E. Moser's Dark Antique Sheraton aniline dye stain		Woodworker's Supply
	Reproduction squarehead nails		
	Finish nails		
	No. 8 × 1 1/2 (38mm) Slotted-head wood screws		
	Screw-hole plugs		
	Lacquer sanding sealer		
	Lacquer		
	Glue		

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Step 1 Begin the piece by gluing the side panels. Mark the location for and cut the 1/8” deep by 3/4"-wide dadoes for the top panel, drawer dividers and bottom panel. I use a straightedge with a 3/4" pattern bit for this procedure. Make sure you have mirror-image sides.

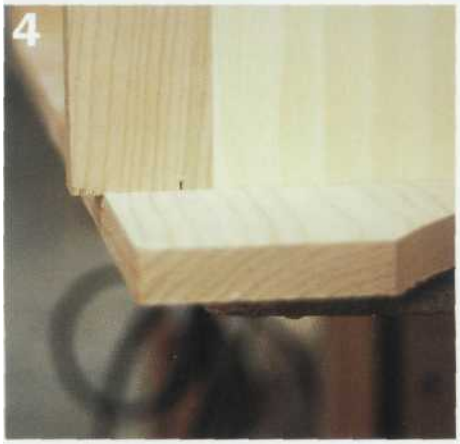
step 2 Cut the top design, as well as the arched cutouts at the bottom of each side.

Step 3 with the drawer dividers milled, set the saw blade to create a 1/8”-wide by 3/8”-deep notch on the front edges of each divider and the bottom panel.

step 4 Next, fit the bottom panel with the front edge, extending the bottom panel V' in front of the side panels. Nail the joint**.**

step 5 Pit the top panel into the groove while holding the edge of the panel flush with the sides. Nail the joint with a reproduction squarehead nail**.**

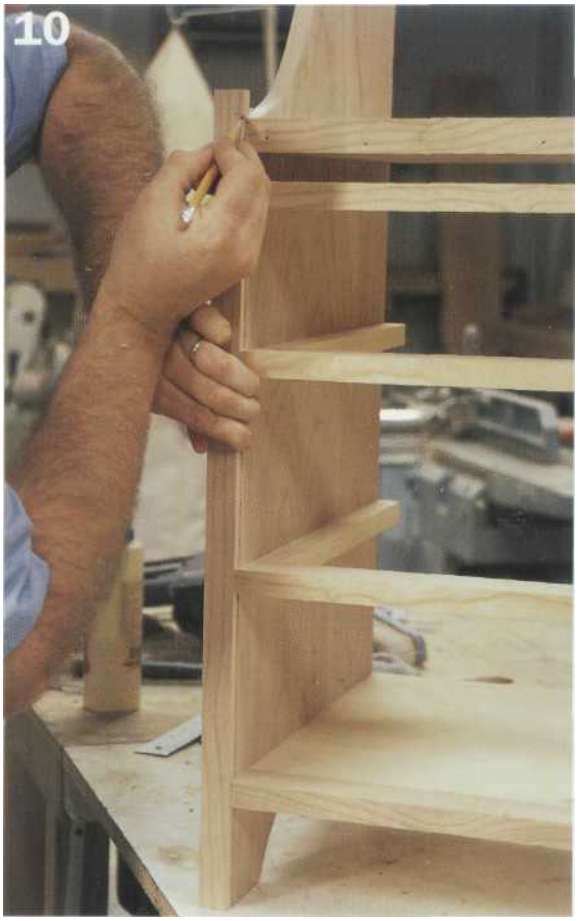
Step 6 After cutting the 1/4" x 5/8" mortise in the dividers, cut a matching tenon on one end of the drawer runners.



Step 7 Install the drawer dividers into the dadoes in the sides and nail, making sure that the nail enters the solid area of the dividers, not the mortised area.

step 8 Next, lay the piece on its side and glue the tenon on the runners into the mortise in the dividers. Then place a single nail through the side into the runner, locking it into the dado.

step 9 With the dividers and runners in place, set the cabinet upright and cut the case side mouldings to lit. Attach these with glue and a few nails. Here vou can see the shallow groove made in the moulding to capture any excess glue, preventing it from spreading onto the sides.



Step 10 After attaching the face-frame trim to the top panel with a bit of glue and a few finish nails, measure and repeat the process with both side trim pieces.

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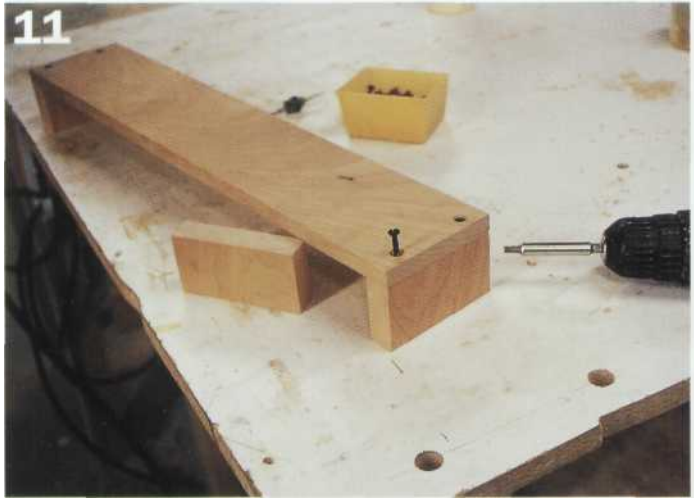
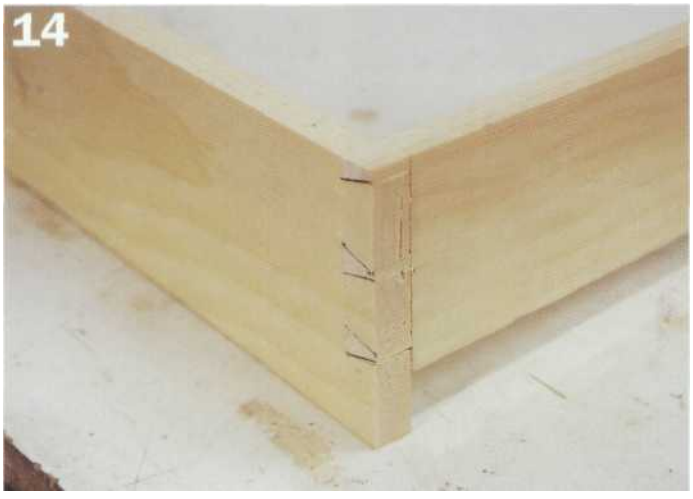


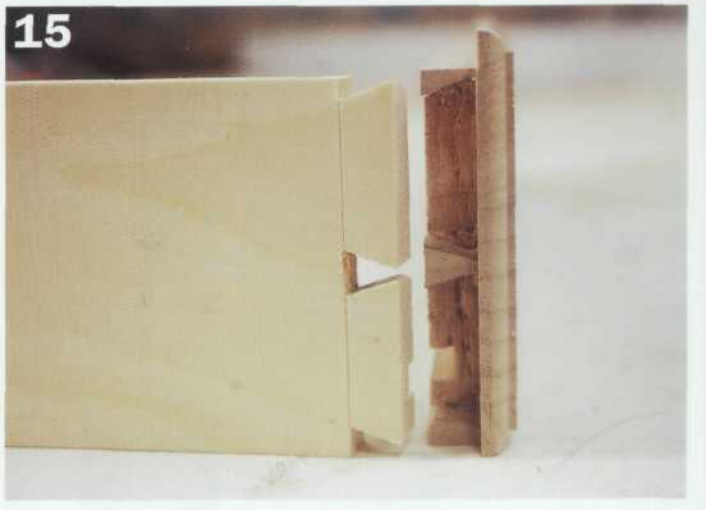
Step 11 Take the small drawer area bottom and attach the dividers with screws. One divider at each end and the third at the center equally separate the space.

Step 12 Set that assembly in place, bottom down, and using screws, attach it to the sides, making sure that the dividers are flush with the top edge of the sides. With that accomplished, set the top piece in place and attach it, as well. Fill the screw holes with a matching plug.

step 13 Mill the drawer front and slide shelf front pieces to size, mould the edges with a 3/16" roundover bit and create the rabbet detail on the top and sides of the fronts, leaving the bottom edge intact.

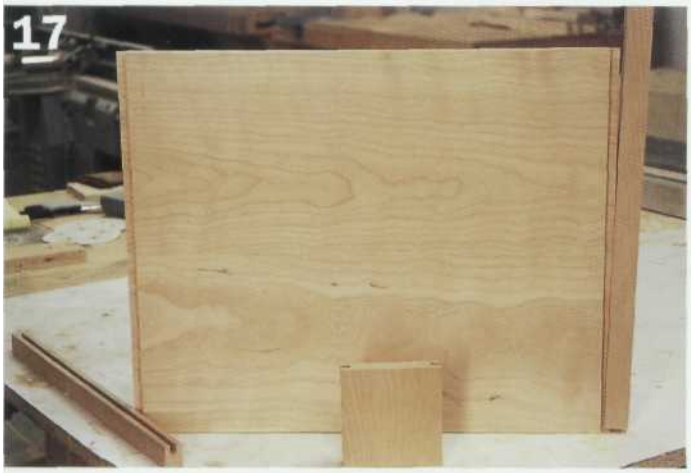


step 14 Dovetail the drawer parts. I start with the back and lay out the pins first. Next, transfer the lines for the matching tails using the pins.



step 15 Repeat the process with the fronts and sides (tails on the sides), then locate the 1/4" x 1/4" groove that will accept the drawer bottoms.

step 16 Make the drawer bottoms with the beveled edge to fit into the groove. Cut a blade-wide slot into the bottoms so that it terminates just at the inside edge of the drawer back. Slide the bottoms into place and secure with a nail as shown.



step 17 Mill the slide shelf and create the 1/4" x "1/4" tenons on the two ends. Create a matching groove on the slide shelf ends, just as breadboards on a table, and attach with nails through the ends. Here you can see that 1 mill those grooves on a wider piece and then cut to the required width.

step 18 With glue and finish nails, attach the slide shelf front into place with the bottom edge flush, creating the lip at the top and ends.

step 19 Next, make the backboards for the chest, remembering that the top board needs to be made from matching hardwood. It will be seen from the front and should be treated in the finish stages just as the case and drawers are.

step 20 This piece is finished with a water-based aniline dye stain, J.E. Moser's Dark Antique Sheraton, and when dry, sealed with lacquer sanding sealer, then top-coated with lacquer. The entire piece was sprayed using an HVLP (high-volume, low-pressure) system. With the finish complete, attach the backboards and secure the knobs to the drawer fronts.

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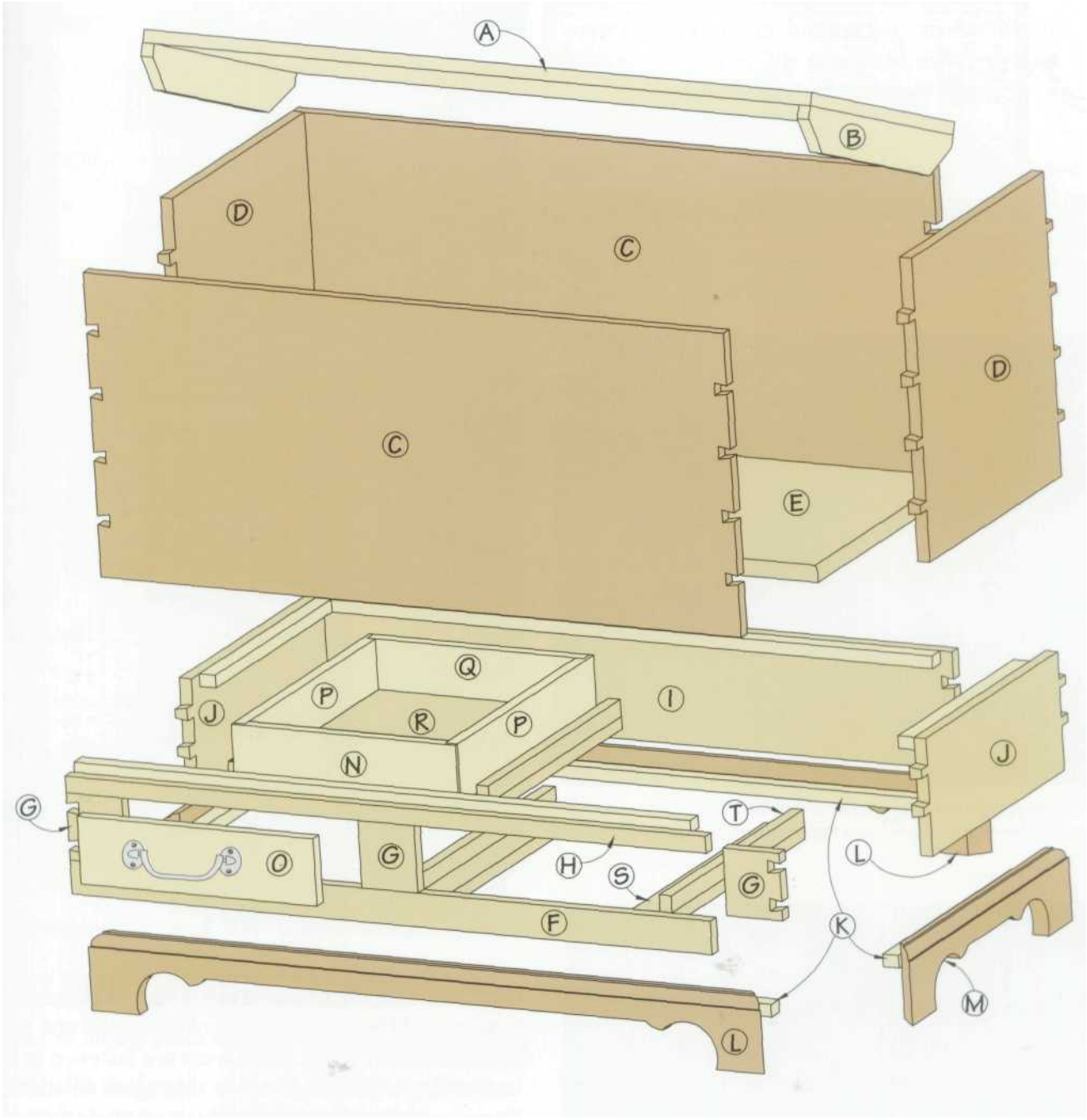
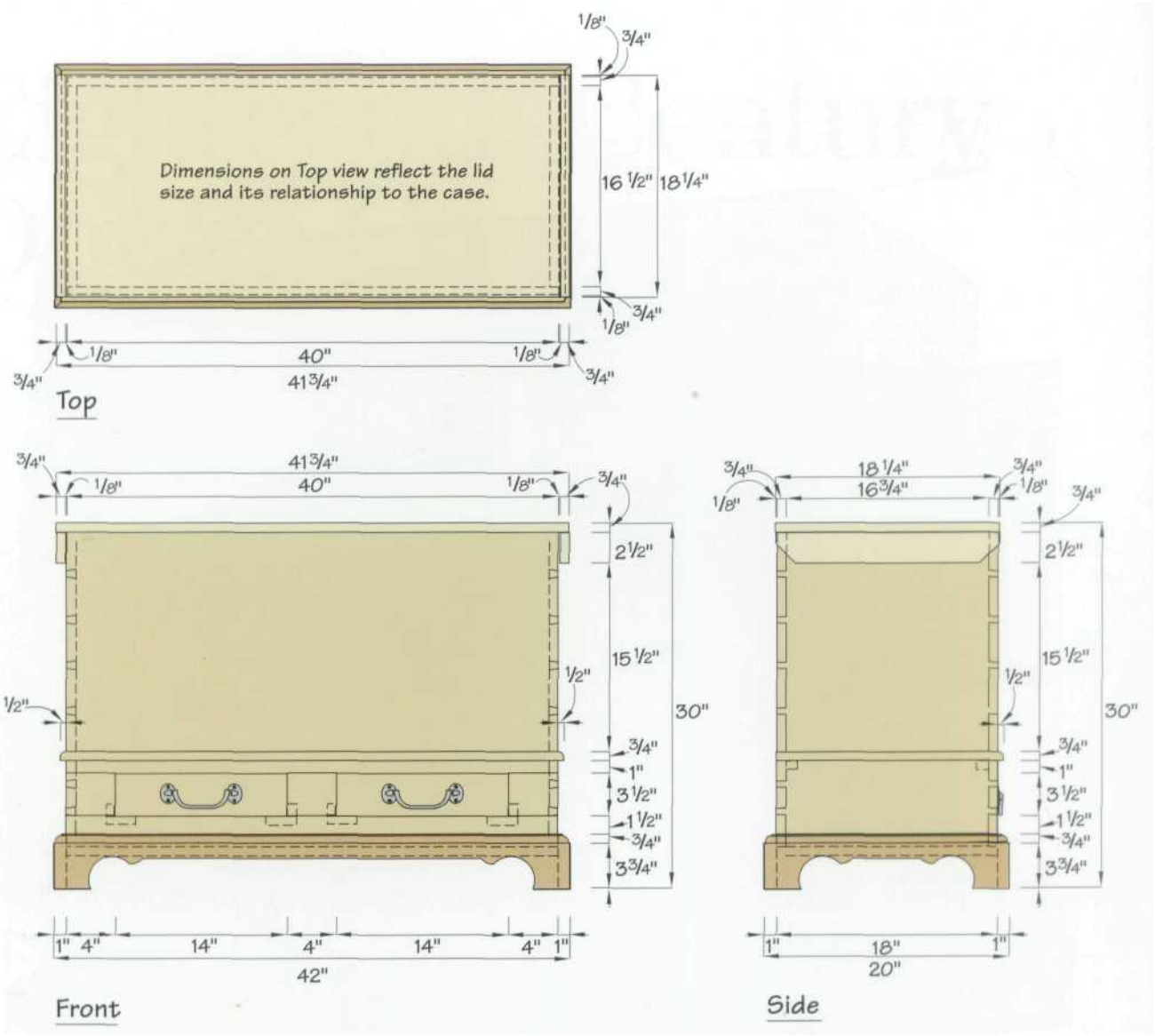
Eighteenth-Century Dower Chest

For hundreds of years, at least from the time of the Norman Conquest in England, chests like this were traditionally built for a girl when she reached ten years of age. In it she would store personal items, her own needlework and other bits and pieces accumulated over the years preceding her marriage. Today the tradition is still alive, but now the dower is called a hope chest. During medieval times the chest was a very heavy piece, constructed usually from oak. Later they were made mostly of pine. Few have survived the centuries. Those that have are all in museums. During Elizabethan times the chests were still heavy but more intricate in design, usually featuring panel construction. Early American versions were often simple six-board affairs. Later they were much better made with dovetail joints and one or two drawer's below the chest. Some had tills (small trays) just inside the top. Most, especially Pennsylvania German versions, were hand painted with lots of color and, perhaps, flowers or animals. The dower chest was usually painted a soft blue



color. Unfortunately, examples with the original paint are extremely rare. The one I have chosen is a copy of a dower chest made in Bucks County, Pennsylvania, circa 1780**.** The original was hand painted with a variety of designs. Not being much of an artist, I left out the designs, preferring instead a heavily aged, distressed look.



CONSTRUCTION OUTLINE

Construction of this piece is quite challenging. Both sections of the chest are constructed using dovetail joints. Whether you put the tails on the ends or the sides is a matter of aesthetics and personal choice. I quite like the large end grains showing, so I put, mine on the face of the piece; you should do whatever pleases you most.

The front of the lower section containing the drawers is made From live pieces of stock. Inside, the drawer runners and guides are secured to cleats that run the entire length of the front and back. The drawers themselves are constructed using simple lap joints, as was the case for many of the earliest versions. You can use half blind dovetails if you prefer. The top and bottom, sides and ends of the upper section are constructed from two, three or four pieces of stock; the end grains are alternated for stability. Cleats are fastened to the undersides of both ends of the top, again for stability. These are held in place with glue and biscuits; dowels would do just as well. The lower skirt, which includes the feet, is mitered to fit around the lower section, then screwed in place from the inside; only the miters are glued. Hardware for a piece such as this is always a problem. I used drawer pulls salvaged from an old piece. The "H" hinges are reproductions. You could use piano hinges but, as always, that would not look light. You'll also need to insert a lid support of some sort.

MATERIALS LIST

Dower Chest

No.	Letter	Item	Dimensions T W L
Top			
1	A	Top	¾″×41¾″×18¼″
2	B	Cleats	¾″×2¼″×18¼″
Upper Chest			
2	C	Front and Back	¾″×40″×18″
2	D	Ends	¾″×18″×18″
1	E	Bottom	¾″×41″×18½″
Drawer Section			
1	F	Front Lower Rail	¾″×2″×40″
2	G	Front Stiles	¾″×4″×3½″
1	H	Front Upper Rail	¾″×1″×40″
1	I	Back	¾″×6″×40″
2	J	Ends	¾″×6″×18″
4	K	Cleats	¾″×1″×38½″
*2	L	Front and Rear Feet	¾″×4½″×42½″
*2	M	End Feet	¾″×4½″×20½″
Drawers			
2	N	Fronts	¾″×3½″×14″
2	O	False Fronts	¾″×4½″×15″
4	P	Sides	¾″×3½″×17″
2	Q	Backs	¾″×3″×13″
2	R	Bottoms	¾″×17″×13″
4	S	Guides	¾″×2½″×17″
4	T	Guides	¾″×1″×17″

*Leave extra length for cutting miters

BUILDING THE CHEST

STEP 1. Cut all the parts to size.

STEP 2. Build the boards that will make up the front, back, ends**,** bottom and lid of the upper chest.

STEP 3. Build th**e** front of the lower section. You can use biscuits, dowels or simple butt joints to secure the five pieces. Glue, clamp and set aside to cure overnight.

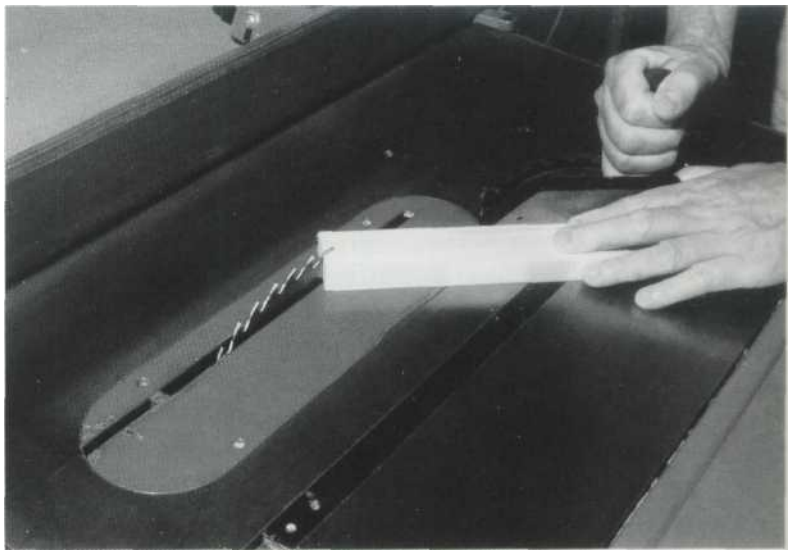
STEP 4. Sand the front of the lower section smooth.

STEP 5. If you have a dovetail jig—I use Leigh's—turn the guide fingers to the TD mode and set the fingers at roughly 2 1/2″ intervals (see photo). This will work quite nicely for both upper and lower sections.

STEP 6. Turn the guide fingers over and cut the tails to the front and rear boards of the upper chest and the front and rear of the lower section.

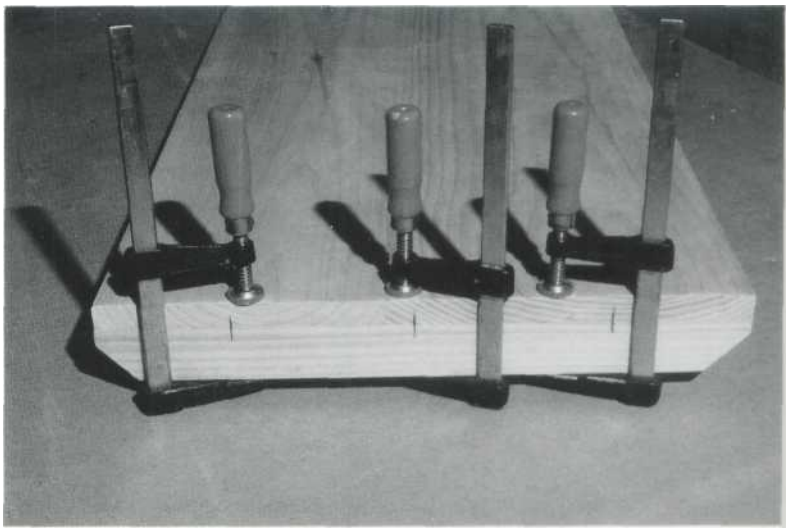
STEP 7. Turn the guide fingers back to the TD mode, set the assembly to cut the pins slightly oversize (see Shop Tip) and cut the pins to the edge of one of the ends of the upper chest.

STEP 8. Remove the work piece from the jig and test, the fit to either the front or back of the upper chest. The fit should be tight. If the pins are too large, reset the jig, replace the workpiece in the jig and recut. the pins. *Be sure you don't cut them too small* (see Shop Tip).

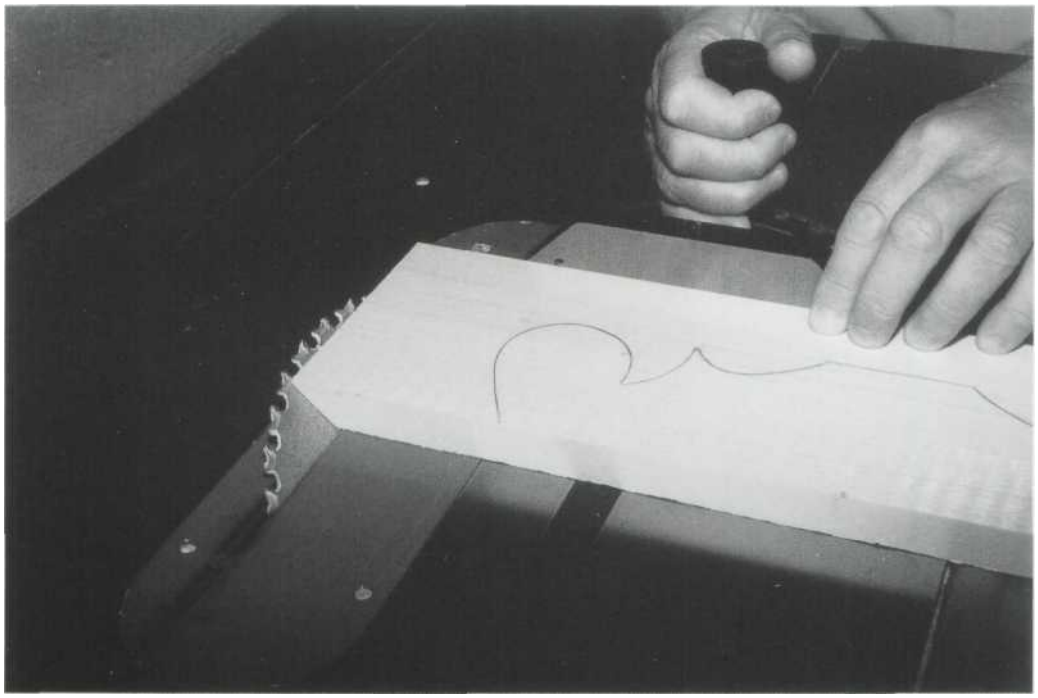


To make the cleats that will support the lid and slop it from warping, cut your stock to size, and then cut the corners away at a 90° angle.

Fasten the cleats to the lid with biscuits and glue and then clamp



the assembly and leave it overnight, or until the glue is fully cured.



When forming the feet, it's a good idea to cut the miters before you cut the details.

STEP 9. When you've recut the pins, test the fit once **again.** If you have it right, continue on and cut the pins to the remaining pieces of the upper and lower sections.

STEP 10. Use plenty of glue to assemble the dovetailed sections; I use one of the new polyurethane glues. Glue, assemble and damp both the upper and lower sections, Check both to make sure they are perfectly square. Set both sections aside to cure overnight.

STEP 11. Using a 1/2" bit in your router, round over the two ends and front edge of the bottom.

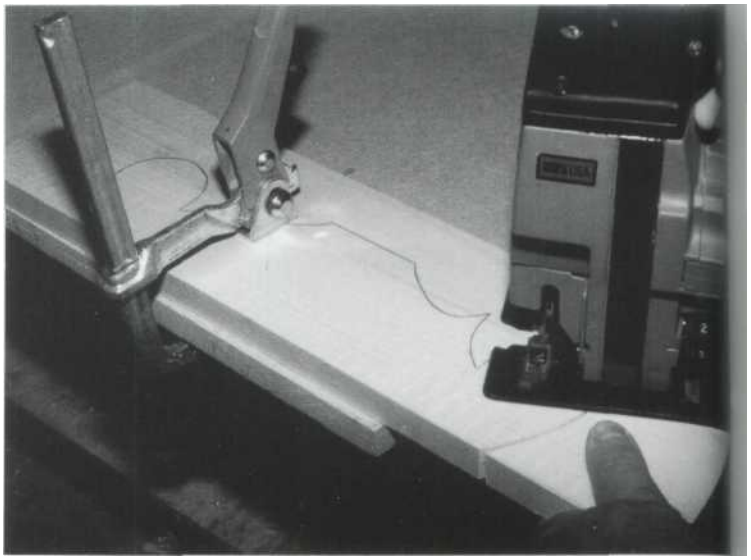
STEP 12. Turn the upper section of the chest so the bottom is uppermost and place it on the bench. Set the bottom board in place, making sure it is flush with rear of the chest and projects at the front and equally at both **ends.** Now, using ten no. 6 X 1 3/4″ screws—four along each side and one at each end—fasten the bottom board **to** the chest walls.

STEP 13. Using glue and screws, assemble the two long cleats that will support the drawer guides to the lower section as laid out in the drawing.

STEP 14. Using glue and screws, assemble the two long cleats that will secure the lower section to the upper chest **as** laid out in the drawing.

STEP 15. Build the four drawer guides as laid out in the drawing.

STEP 16. Using glue and screws, assemble and fasten the drawer guides to the lower set of cleats on the lower section. Be sure they run square to the openings.

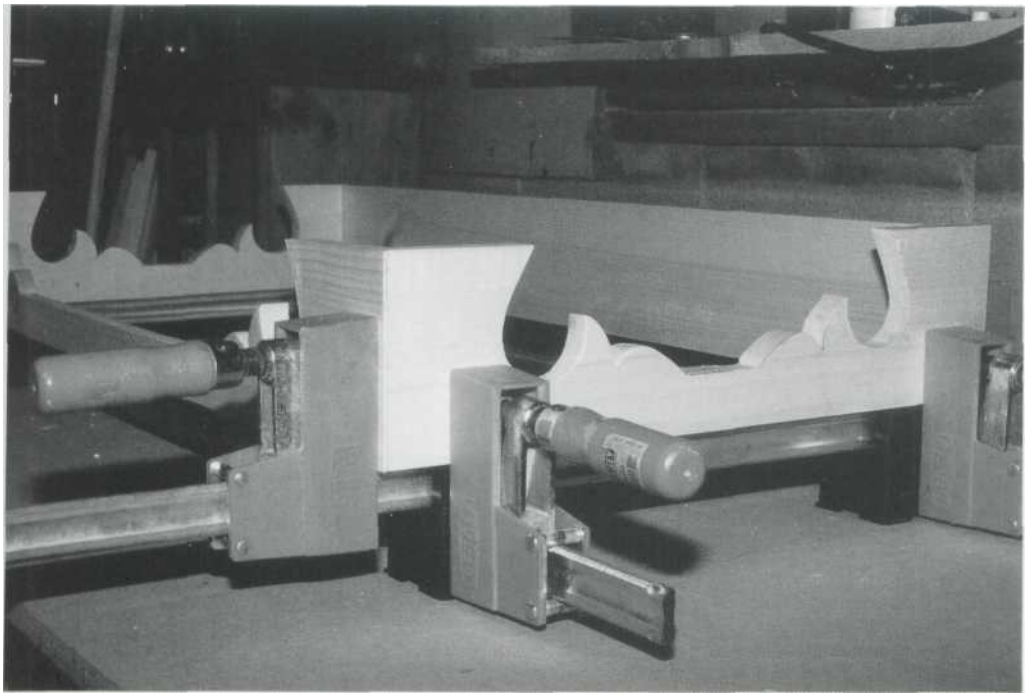


Your jigsaw is the best tool for cutting out the detail to the feet.

STEP 17. With the chest still bottom up on the bench, place the lower section upside down on the underside of the upper chest and set if in place so both upper and lower sections align perfectly.

STEP 18. Using ten no. 6 x 1 3/4" screws—four along each side and one at each end—fasten the lower section **to** the upper chest.

STEP 19. Using the pattern, cut the detail to all four sections of the feet.



Bessy's system of blocks and clamps makes the assembly of the mitered feet section a simple job. Set the clamps in the block, glue the miters, assemble the pieces, apply slight pressure with the clamps, make sure all is square, and then fully tighten the clamps and leave the piece overnight, or until the glue has fully cured.

STEP 20. Cut the feet sections accurately to length and miter the ends to 45°.

STEP 21. Cut the cleats to length and glue and screw them in place, 1" from the top, on the inside of the feet sections as you see in the drawing.

STEP 22. Still with the chest assembly upside down on the bench, from the inside of the lower section, screw the front and rear feet sections in place.

STEP 23. From the inside, and using a little glue on the miters, screw the two end-feet sections in place. Set the assembly aside and leave overnight or until the glue fully cures.

STEP 24. Using a 1/2″ bit in your router, round over the top edge of two ends and both edges of the top front.

STEP 25. Mark the cleats and lid for biscuit slots.

STEP 26. Mill the biscuit slots to the cleats and lid.

STEP 27. Glue and clamp the cleats to the lid, set aside and leave overnight to cure.

STEP 28. Finish sand the entire assembly using 220-grit paper, *but do not assemble the lid to the chest yet*. Wait until the finishing is complete.

STEP 29. Using simple lap joints, build the drawers as you see in the drawing.

STEP 30. Using a ¼" bit in your router, round over the edges of the two drawer false fronts.

STEP 31. Fasten the drawer pulls to the false fronts.

STEP 32. Using four no. 6 X 1 1/4″ screws—two to each drawer—fasten the false fronts to the drawers.

STEP 33. Assemble and fasten the drawer bottoms.

STEP 34. Apply the finish to all sections.

STEP 35. Using three hinges, assemble the lid to the chest.

STEP 36. Assemble the lid support to the inside of the chest and lid.

SHOP TIP

Leigh Dovetail Jig

To ensure optimum results from your Leigh dovetail jig, or any dovetail jig, make sure the workpiece touches not only the two stops on lower left of the jig *but the underside of all of the fingers*. Failure to do this will cause a slight misalignment—steps at the bottom and top edges—between the sections.

FINISHING

I chose an old painted look for this piece. You can follow my lead or simply stain it and give it a couple of coats of polyurethane, but that would miss the point somewhat.

The peeling painted finish you see in the color shot will take a bit of work, but the final effect is well worth the effort and you'll end up with a chest that does, indeed, look a couple of hundred years old. It's very effective and simple to achieve.

STEP 1. First you'll need to do some distressing. Over an extended number of years, a piece like this would receive quite a beating. The upper edges of the chest would have been extensively knocked about, as would the cornel's of both sections and feet. The top front to edge of the chest would have been heavily worn and rounded. The corners would have rounded over. The lid would have a lot of dents and dings, and I wore away the front edge and inward from the edge for about six inches to duplicate the wear one might expect from a couple of hundred years of people sitting on it. You really can't go overboard on a piece like this.

STEP 2. Next, apply an appropriate stain to give the wood an underlying patina. I chose Minwax's Provincial, but Early American or Blond-it's Bleached Mahogany would have done just as well.

STEP 3. To achieve the peeling paint look you see in the photo, follow the steps for the Peeling Paint Effect on page 22 of chapter three.

STEP 4. Now you'll need to apply the wear and tear of the ages. Using 320-grit wet-and-dry and a lot of water, wear away the paint to the polyurethane coats below but take care not to go too deep. Show the bare, unstained wood and you'll spoil the entire finish. Also, be careful to use only the lightest pressure for the rubbing down; the paint may still tend to strip.

STEP 5. Finally, apply a light film of antiquing glaze—don't overdo this—and seal the finish with a couple of coats of satin polyurethane.

Assemble the lid to the chest and you're done.

SHOP TIP

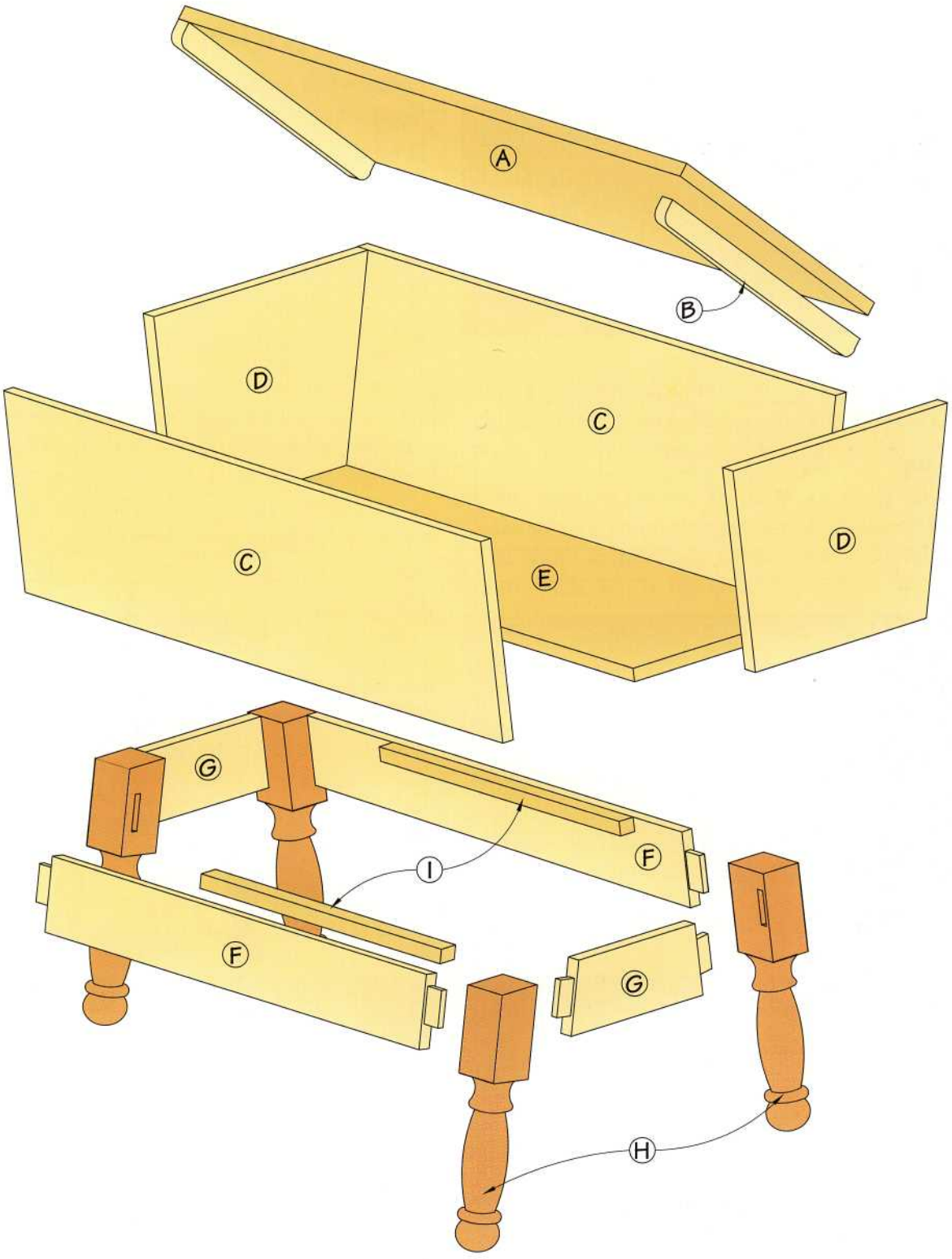
Cutting Tight Dovetails

It may cause something of a struggle during assembly, but I recommend you set your dovetail jig to cut the tails a little tighter than for a normal fit. The tendency for long sections of joints such as this is to cut them slack to make assembly easier.

Unfortunately, this will have several effects. First the joint will be weak and subsequently the glue may break. Second, you'll have a lot of filling to do between the pins and tails. Finally, you'll have to clamp almost every pin and tail to bring everything together while the glue cures. Cut the tails for a tight fit and you'll not only eliminate all of the above, but the pins will pull the joint tightly together and the resulting assembly will be almost perfectly square.

Nineteenth-Century Dough Box

The dough box was a functional piece found in many a country kitchen. The idea was that the cook would make a large batch of bread dough, knead it on the large work surface that formed the lid, then throw it inside the box and leave it to rise. Once the dough had risen she would bring it out again, drop it once more on the surface of the lid and prepare it for the oven. Today, the piece is just as functional, though not used for dough. Most dough boxes are used as storage units, conversation pieces and decoration. They come in all shapes and sizes, depending upon the size of the house where they originated. Some had square or tapered legs; others had turned legs. A large country home with a large family and staff would have required more baked goods than a small town house, thus the box would have been in the order of perhaps 48" wide X 24" deep X 27" high. Ours is a smaller unit 36" wide X 17" deep X 27" high. I found it in a book of American country antiques. It was dated to the early 1800s and was somewhat primitive in design. I have changed nothing except to add hinges to the one-time lift-off lid. This makes it a little more functional and convenient. What can you use it for? How about storing linens-tablecloths, napkins, etc.?



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CONSTRUCTION OUTLINE

For the sake of authenticity, I constructed the box section using glue and cut-steel nails. The ends are tapered to an angle of 8°. The bottom of the box is attached with screws. The top is a simple board built from several smaller pieces of stock, the grain alternated for stability,

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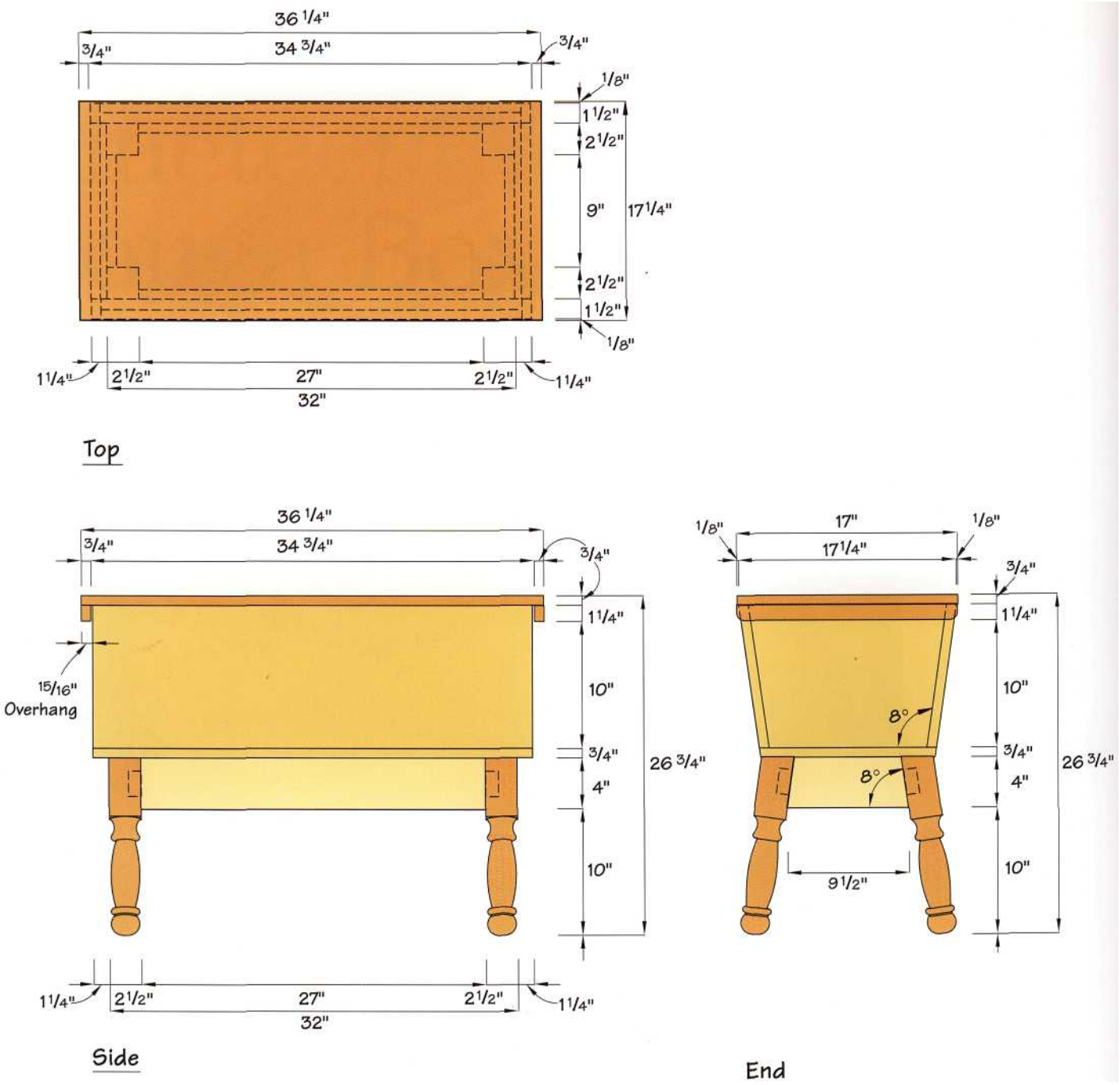

MATERIALS LIST

Dough Box

No.	*Letter*	*Item*	*Dimensions T W L*
1	A	Top	¾″ × 36¼″ × 17″
2	B	Cleats	¾″ × 1¼″ × 17¼″
2	C	Box Sides	¾″ × 11¼″ × 34¼″
2	D	Box Ends	¾″ × 11¼″ × 15½″
1	E	Box Bottom	¾″ × 13¾″ × 34
2	F	Aprons	¾″ × 4″ × 29
2	G	Aprons	¾″ × 4″ × 10½″
4	H	Legs	2 ½″ × 2½″ × 14¼″

biscuited together. The original had cleats added to the ends of the lid, just as I have done, but did not have hinges; ours does. The understructure is a simple affair built using mortise and tenon; the legs are splayed forward and backward at an angle of 8° to match the box section. I kept the finish simple, just as it was on the original. These pieces were used exclusively in the kitchen and saw a lot of water, so I gave this one the scrubbed look you'll find described on page 25.

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BUILDING THE DOUGH BOX

STEP 1. Cut all the pieces to size as laid out in the materials list, then run them through the jointer to clean up the edges.

STEP 2. Build the boards to make the top and bottom of the box unit.

STEP 3. Glue and screw the cleats to the underside of the top.

STEP 4. Sand the top smooth and set it aside.

STEP 5. Go to the lathe and, using the pattern provided, turn the four legs. If you don't have a lathe you can use tapered legs. The procedure is as follows: set your tapering jig to 3° and taper the legs on the two inside edges, making sure you have two right- and two left-hand legs. Begin the taper 4" down from the top of the

STEP 6. Cut the mortises—1" deep x 3/8" x 2"—in the tops of the legs as you see in the drawing.

STEP 7. Set your table-saw miter gauge to 8° off 90 and trim the two end pieces of the apron. Do the same to the ends of the two pieces that will make the end pieces of the box.

STEP 8. Remove the guard from your table saw and set the blade to cut at a depth of 1".

STEP 9. If you have a tenoning jig, set the back-stop to 8° off the vertical and cut the cheeks. **Note:** Do this first on a piece of scrap stock and test the tenon for fit in one of the mortises.

STEP 10. Mark the shoulders at an angle of 8° (see photo below) to accommodate the angle inside the mortise.

STEP 11. Use your band saw to cut the scrap stock away from the shoulders.

STEP 12. Replace the guard on your table saw and tilt the blade to 8°.

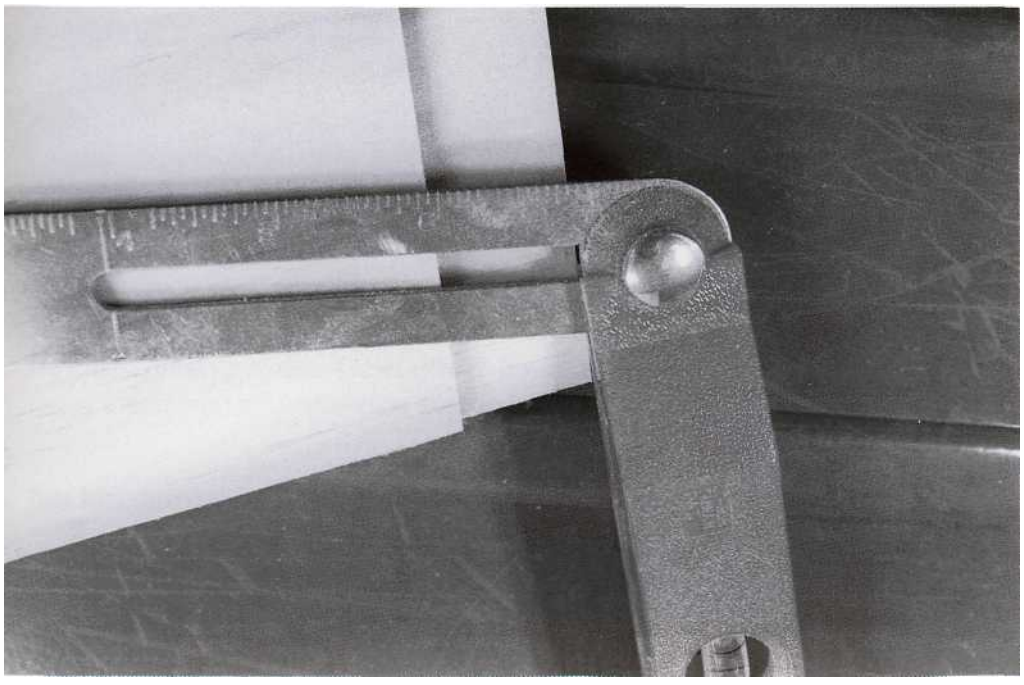
STEP 13. Set your rip fence to 4", lay the apron pieces flat on the table, outer side up, top edge toward the blade, and trim the edge to 8°; this is so the top of the understructure will fit flush to the underside of the box. **Note:** You can do this step on your jointer if you wish.

STEP 14. Do the same to the tops of all four legs, once again making sure you maintain two left and two right. This is also so the top of the understructure will fit flush to the underside of the box.

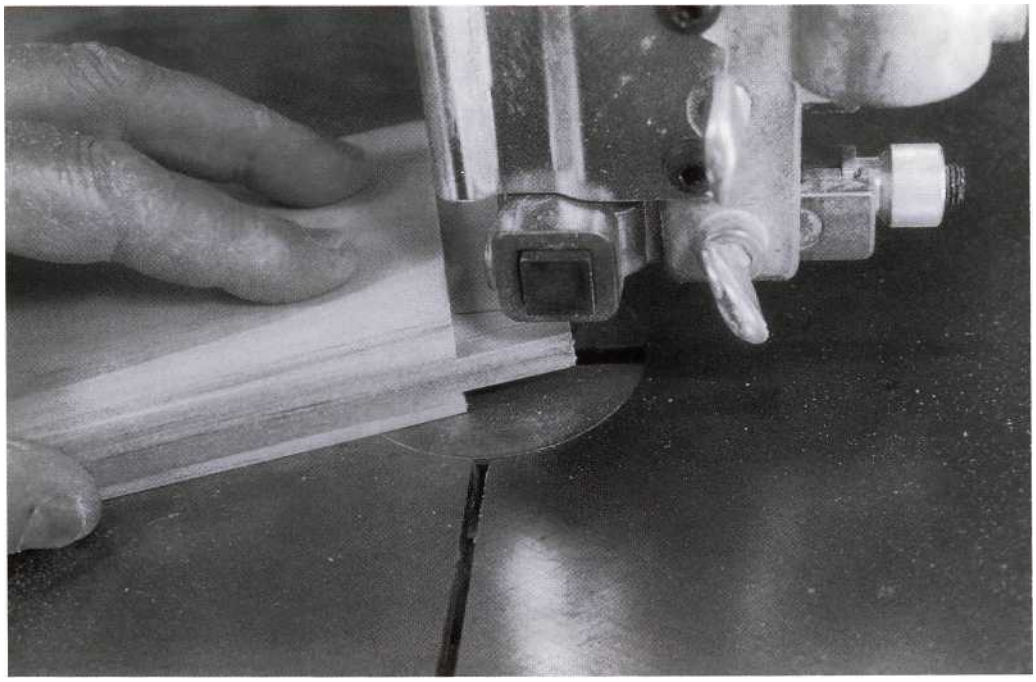
STEP 15. Take the four pieces that comprise the apron to the drill press and mill the pocket holes you'll use to attach the understructure to the box unit.

STEP 16. Dry fit all the rails to the legs and lay the lid, upside down, on the structure; all should sit true.

STEP 17. Disassemble all the pieces, sand everything smooth, then glue and reassemble the understructure, clamp it and leave overnight or until the glue has fully cured.

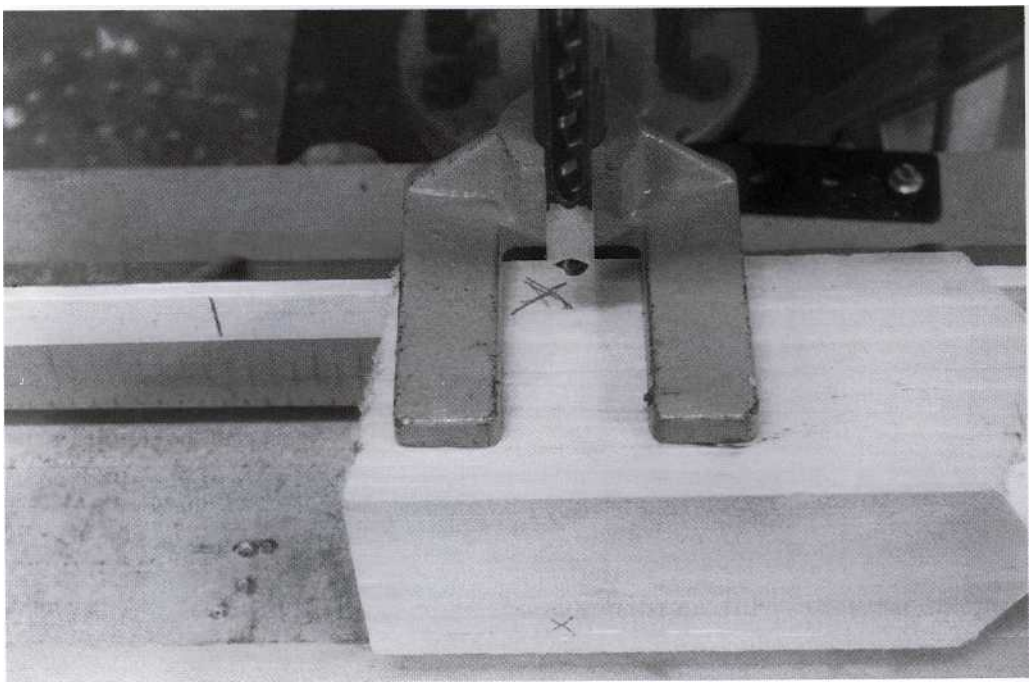


Use a movable square to mark the angles of the tenons to the rails that make up the apron.



The best way to cut away the waste at the shoulders of the tenons is to do it freehand on your band saw.

Before you mill the mortises, mark the position of each one to ensure you have two left- and two right-hand legs.



STEP 18. With the table-saw blade still set at an angle of 8°, mill the top and bottom edges of the two long sides of the box section so the top and bottom will fit flush.

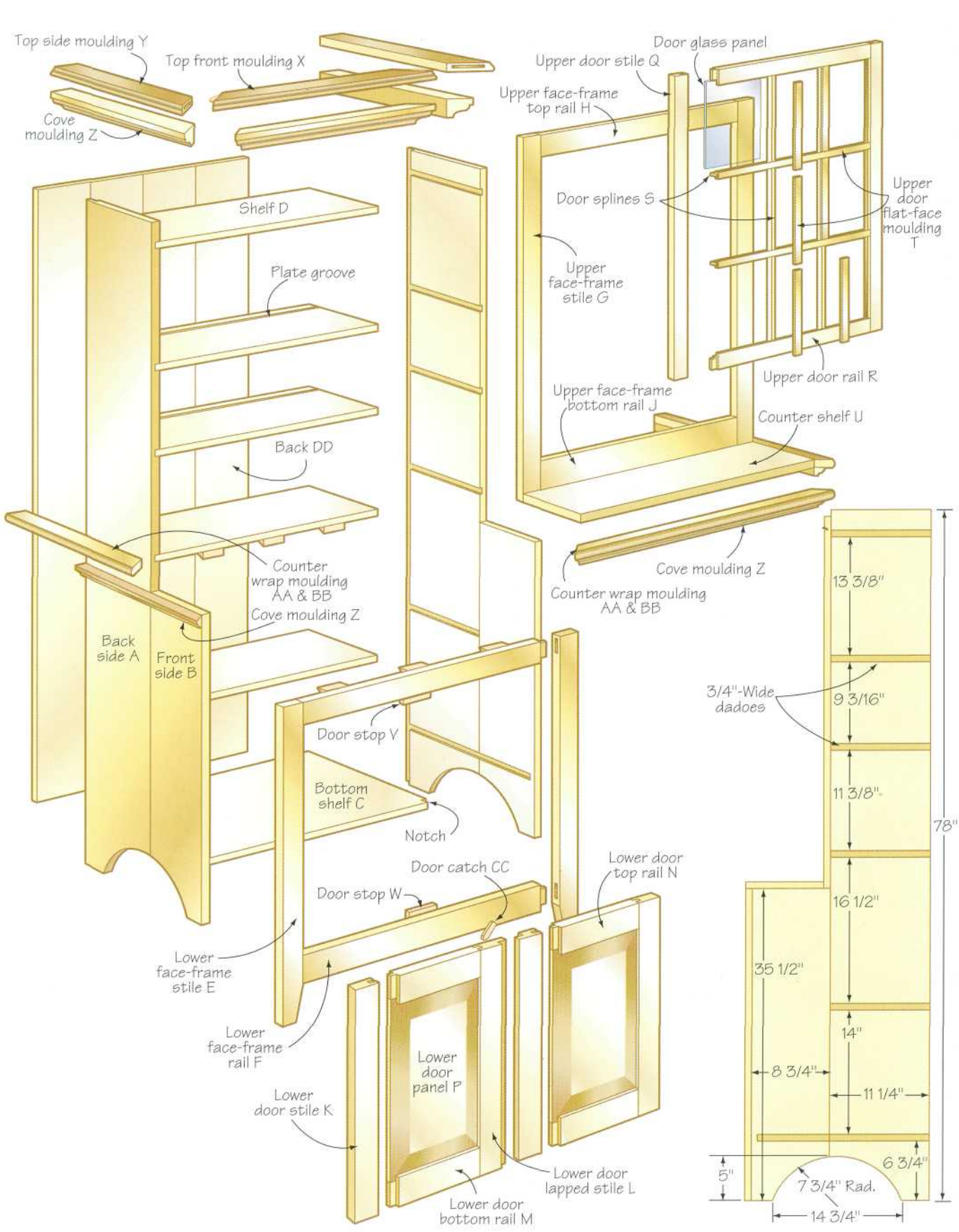
STEP 19. Take the bottom board to the table saw and mill both edges to an angle of 8° so the bottom and sides will both follow the 8° splay.

STEP 20. Using 1 3/4" cut-steel nails and glue, assemble the box unit. **Note:** You'll need to drill pilot holes to accommodate the nails. First use a 1/8” bit and drill through both pieces of stock, then a slightly larger bit to enlarge the hole in the outer piece only. Clamp the structure, making sure it's square, and set it aside until the glue is fully cured. **Note:** Bessy makes a clamp that works well when clamping angled .

STEP 21. Place the box unit on the bottom board and mark a pencil line around inside.

STEP 22. Remove the box unit and, using the pencil line as a guide, drill twelve pilot holes in the bottom board—four along each side and two at each end.

DIMINUTIVE DISH CUPBOARD



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DIMINUTIVE DISH CUPBOARD

inches (millimeters)

REFERENCE	QUANTITY	PART	STOCK	THICKNESS	(mm)	WIDTH	(mm)	LENGTH	(mm)	COMMENTS
A	2	sides (back section)	pine	3/4	(19)	11 1/4	(285)	77 1/4	(1962)	
B	2	sides (front section)	pine	3/4	(19)	8 3/4	(222)	35 1/4	(895)	
C	1	bottom shelf	pine	3/4	(19)	19 1/4	(489)	37 1/4	(946)	
D	5	shelves	pine	3/4	(19)	10 1/2	(267)	37 1/4	(946)	
E	2	lower face-frame stiles	pine	3/4	(19)	4	(102)	25 1/4	(641)	
F	2	lower face-frame rails	pine	3/4	(19)	3	(76)	32 1/4	(819)	1" (25) TBE
G	2	upper face-frame stiles	pine	3/4	(19)	3 1/4	(82)	42	(1067)	
H	1	upper face-frame top rail	pine	3/4	(19)	4 1/4	(108)	33 3/4	(857)	1" (25) TBE
J	1	upper face-frame bottom rail	pine	3/4	(19)	3 3/4	(95)	33 3/4	(857)	
K	3	lower door stiles	pine	3/4	(19)	2 7/8	(73)	24 1/4	(616)	
L	1	lower door lapped stile	pine	3/4	(19)	3 1/4	(82)	24 1/4	(616)	
M	2	lower door bottom rails	pine	3/4	(19)	3 1/4	(82)	12	(305)	1 1/4" (32) TBE
N	2	lower door top rails	pine	3/4	(19)	3	(76)	12	(305)	1 1/4" (32) TBE
P	2	lower door panels	pine	5/8	(16)	10 1/2	(267)	18 5/8	(473)	
Q	2	upper door stiles	pine	3/4	(19)	2	(51)	34	(864)	
R	2	upper door rails	pine	3/4	(19)	2 1/2	(64)	30 1/4	(768)	1 1/4" (32) TBE
S	5	upper door splines	pine	1/4	(6)	1/2	(13)	30	(762)	
T	5	upper door flat-face mouldings	pine	1/4	(6)	3/4	(19)	30	(762)	
U	1	counter shelf	pine	3/4	(19)	8 3/4	(222)	39	(991)	trim to fit
V	1	lower door stop (top)	pine	5/8	(16)	3	(76)	2 3/4	(70)	
W	1	lower door stop (bottom)	pine	5/8	(16)	3	(76)	1 1/4	(32)	
X	1	top moulding (front)	pine	3/4	(19)	3 3/8	(86)	45	(1143)	
Y	1	top moulding (side)	pine	3/4	(19)	3 3/8	(86)	32	(813)	
Z	2	cove mouldings	pine	3/4	(19)	3 1/8	(79)	45	(1143)	
AA	1	counter shelf edge moulding	pine	3/4	(19)	2 1/4	(57)	45	(1143)	
BB	2	counter trim mouldings	pine	5/8	(16)	7/8	(22)	45	(1143)	
CC	1	lower door catch	pine	5/8	(16)	3/4	(19)	5	(127)	
DD	1	backboard	pine	5/8	(16)	37 1/2	(953)	75	(1905)	made up of many boards

Note: TBE = tenon both ends.

hardware

2	1"-dia. (25mm-dia.) Antique-finish cupboard turn knobs	item #H-97	Horton Brasses
1	1"-dia. (25mm-dia.) Antique-finish dummy knob	item #K-12	Horton Brasses
1 pair	2 1/2" (64mm) Blackened upper hinges		local hardware store
2 pairs	2" (51mm) Blackened lower hinges		local hardware store
	1 1/2" (38mm) Case nails	item #N-5	Horton Brasses
	1 1/2" (38mm) Back nails	item #N-7	Horton Brasses
	Full-restoration glass for upper doors		Bendheim
	Glue		
	Glue blocks		
	#20 Biscuits		
	1 1/4" (32mm) Flathead wood screws		
	Cherry aniline dye		
	Shellac		
	Paint		
	Dark wax		
	Durham's Water Putty		

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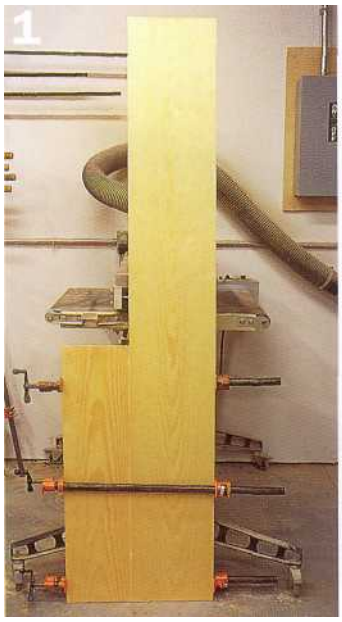


step 1 Begin this cupboard by gluing the pieces for the sides. I used two pieces and cut them so the lower portion was cut straight and located exactly where it is necessary.

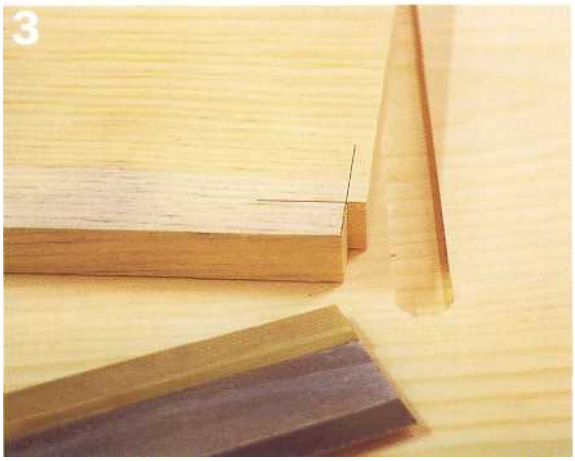
step 2 Next, lay out and cut the dadoes according to the plan. Remember that the dado for the shelf in the lower area is a stop-dado.

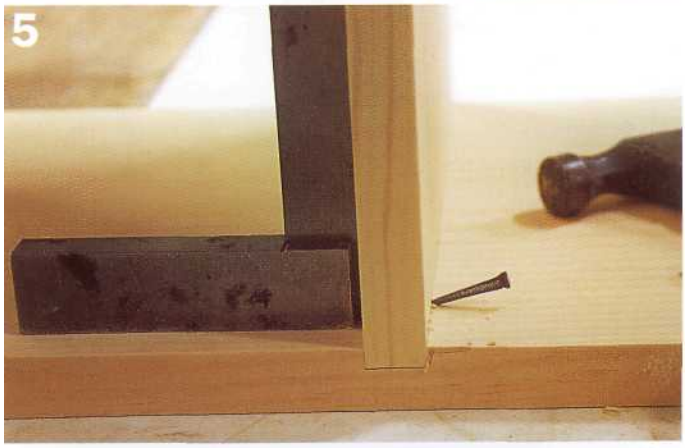
step 3 After cutting the rabbet for the backboard, mill the shelves to size. For the bottom shelf, notch the front edge to accommodate the stopped cut.

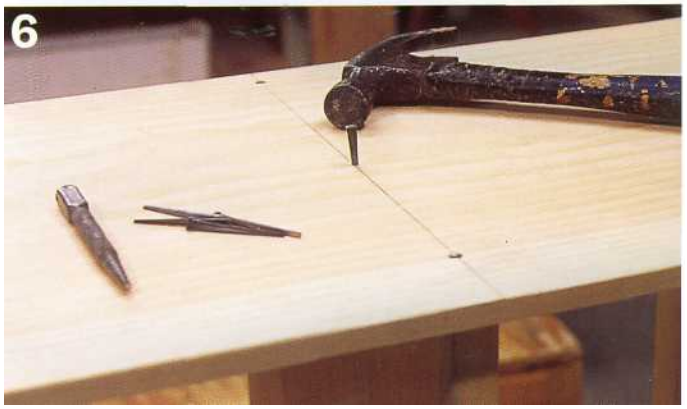
Step 4 Apply a small amount of glue in the dadoes and install the shelves.

step 5 Nail through the under-side of each shelf, using a square to set the shelf at 90° to the sides.

Step 6 Repeat the process on the opposite side and place three nails through the sides at each shelf.



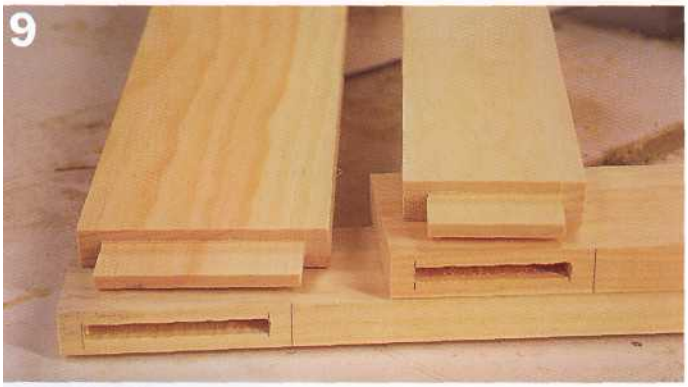




step 7 Mill the pieces for the face frames. Create the mortises in the frame stiles and cut the matching tenons on the rails. Start with the shoulder cuts.

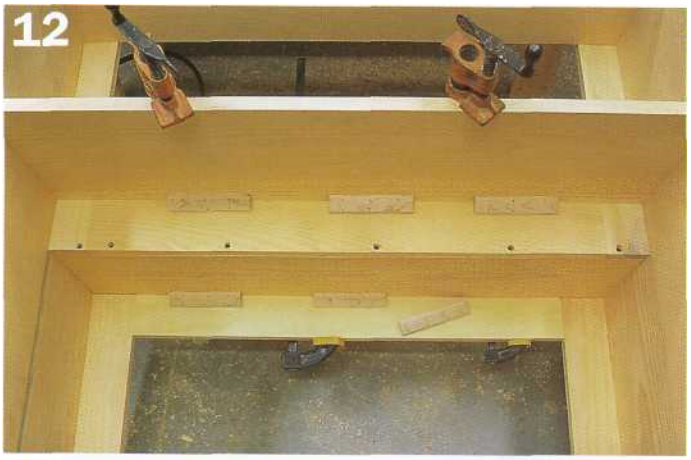
step 8 Finish the tenons by making the cheek and edge cuts.

step 9 With all the joinery cut, glue the face frames and allow them to dry.



Step 10 When they are dry, glue the face-frame assemblies to the cupboard.

Step 11 Mill the counter shelf, fit it to the cupboard and clamp it to hold.



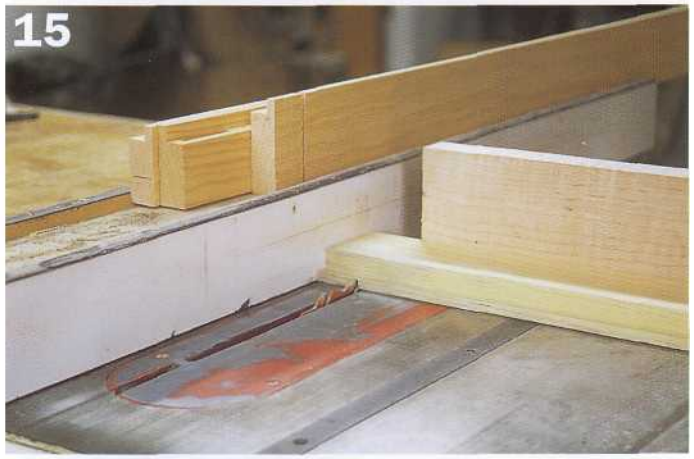
step 12 Place clamps to tighten the upper face-frame rail to the shelf, then turn the cabinet onto the face. Place screws into the back edge of the counter shelf and install glue blocks at the front edges of both shelves.

step 13 Using a 1/2" core box bit and a straightedge, place plate grooves into the appropriate shelves, 1 1/2" from the back edge to the center of the groove.

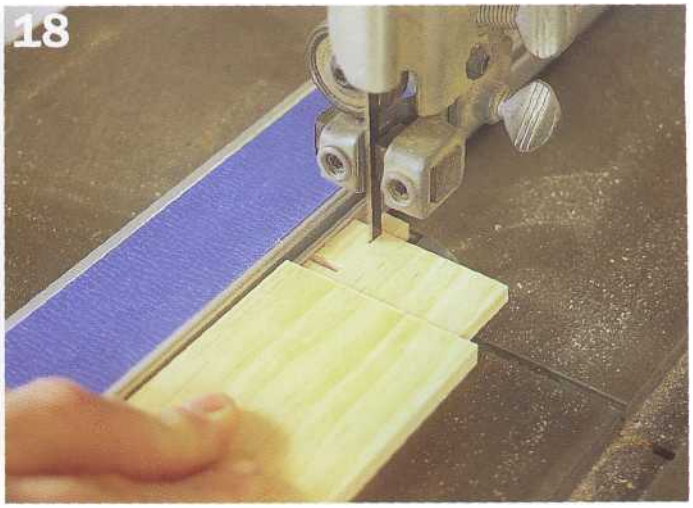
step 14 Next, make the cutout area at the sides and create the angle cuts for the front feet.

step 15 Begin the glass upper door by milling the stock to size, cutting a 3/8" x 1/2" rabbet on the inner edge of all the pieces. Cut mortises in the door stiles, both top and bottom, and make the face-side shoulder cut on the rails.

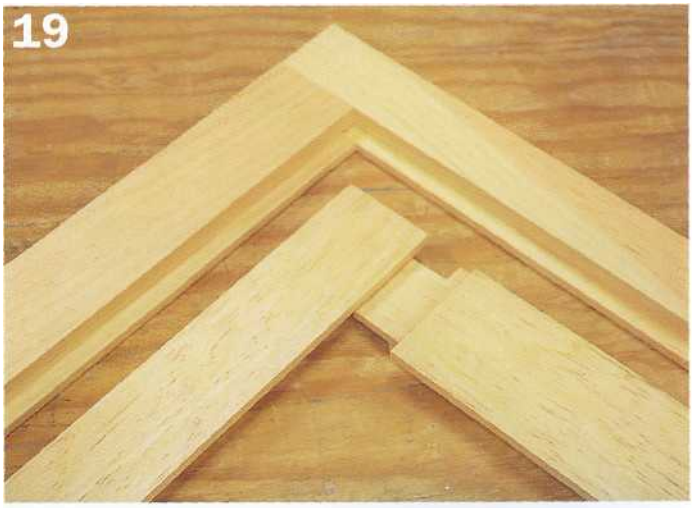
step 16 Adjust the fence 3/8" closer to the blade, then make the rear shoulder cut.



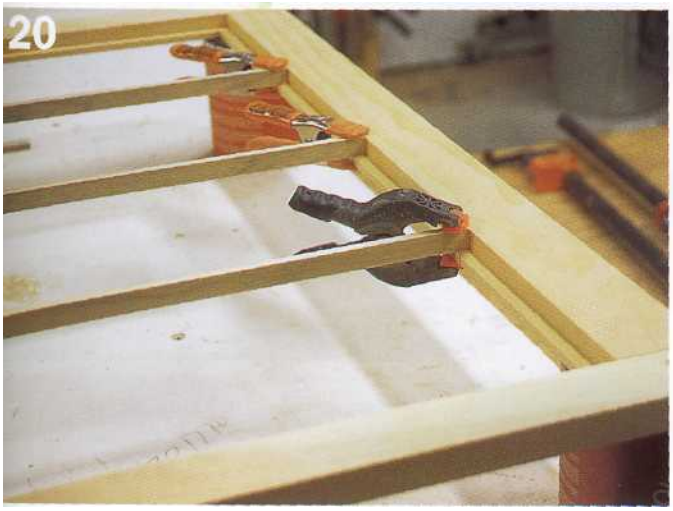
step 17 Raise the blade to 3/8" and make the outer edge cut.



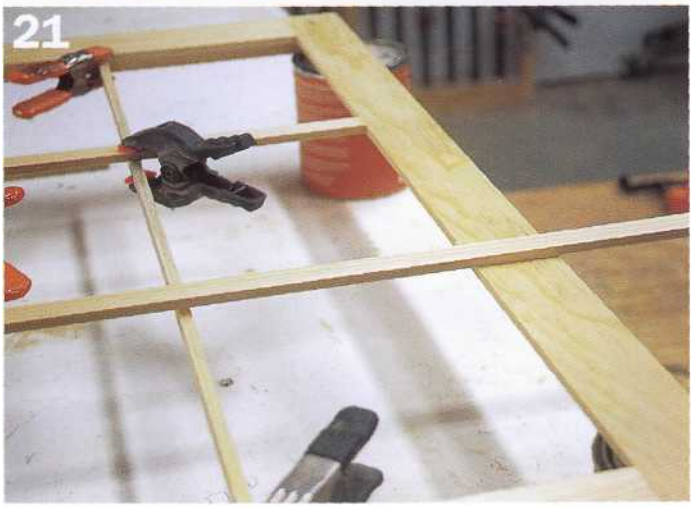
step 18 Next, make the cheek cuts, remembering that there are two different height settings. Remove the haunch area, fine-tune anything necessary, and the door frame is ready to assemble. This method creates the rabbets for the glass in the joinery. It is also possible to rabbet this area after assembling the door frame with simple mortise-and-tenon joints.



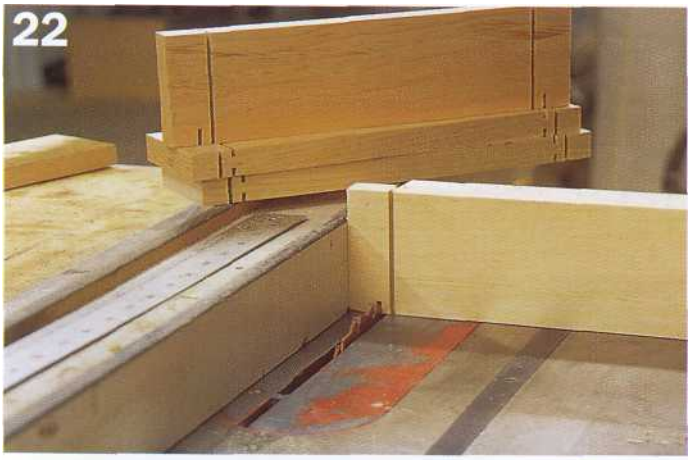
step 19 This is the front and back view of the joinery on the glass door frame.



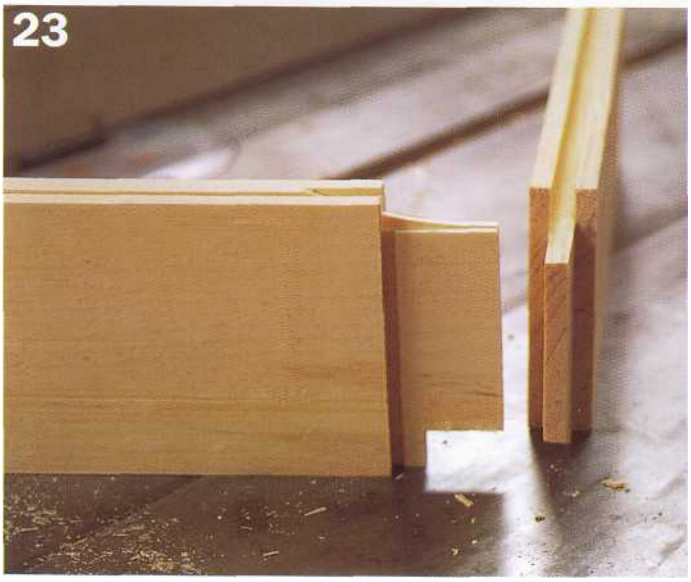
Step 20 With the door dry and pegged, begin the upper door splines. First, fit the door to the case and mark the location of the shelves onto the door frame. The splines should align with the shelves. Glue in the splines from rail to rail, dividing the glass area into three equal sections.



step 21 Flip the door and install the flat-face moulding into the door at each shelf location. Then simply cut and fill the remaining pieces to complete the glass door.



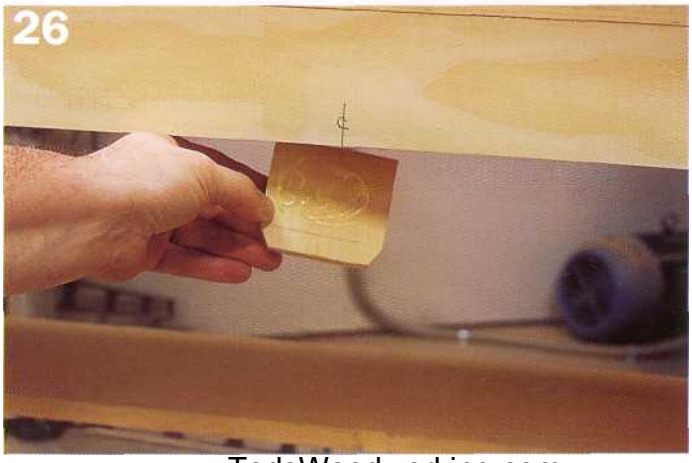
Step 22 Next, turn to the lower panel doors. Mill the stock to size and cut the 1/4" mortises into the stiles, leaving 3/8" at the top and bottom of each rail width. Begin the tenons by setting the blade height to 1/4" and cut the shoulder for each rail. Then, raise the blade to 3/8" and move the fence 3/8" closer to the blade, just as we did in the glass door.



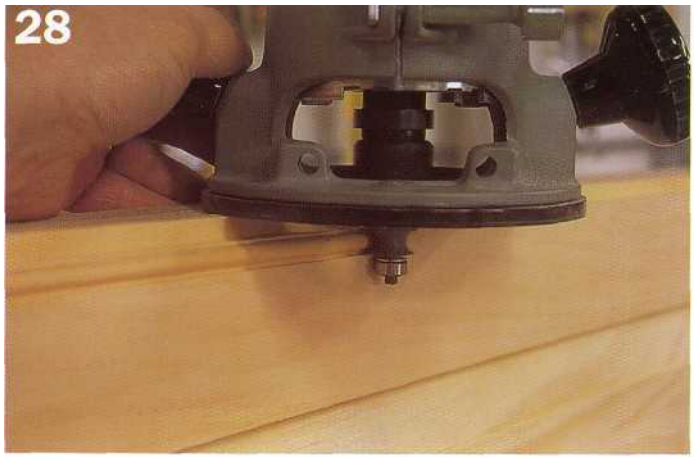
step 23 Make the cheek and edge cuts, then make a 1/4" x 3/8" groove at the center of both the rails and stiles. The end result of the tenons should look like this.

step 24 Mill the panels to size, set the blade at a 12° angle, then, with the fence set to the left of the blade, make the cut to create the raised panel.

step 25 In order to fit the panel to the door groove, you will need to make a 3/8"-high cut on the inside, or back, of the panel. Test the fit and glue the lower doors when complete.



Step 26 Cut the door stops for the lower door, one nailed to the lower shelf and the other as pictured here. Glue them in place and nail from the back to secure.



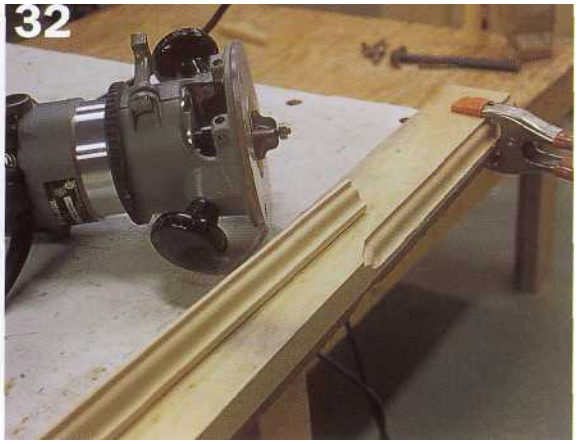
step 27 Hang and fit the lower doors. The operable door (on the right) laps over the other door with a 1/4" rabbet. Mark the edge of both doors onto the case to determine the rabbet location.

step 28 Once the doors are complete and fit into the case, remove them and add the bead detail on the outside edge of all stiles. I use a 1/4" beading router bit with an auxiliary fence clamped even with the door edge.

step 29 Make the counter shelf edge moulding by running a 3/16” roundover bit on all four edges of the 3/4"-thick piece, then rip to the required two pieces that are 1" wide.

step 30 Cut the pieces to size and install the front piece by temporarily clamping a scrap of the moulding at the side.

Step 31 With the front piece in place, nail the two sides in the same manner.



step 32 Mill the counter trim moulding as we did the counter shelf edge moulding, using a Roman ogee bit and ripping to size. When you're ready, cut to fit and nail in place.

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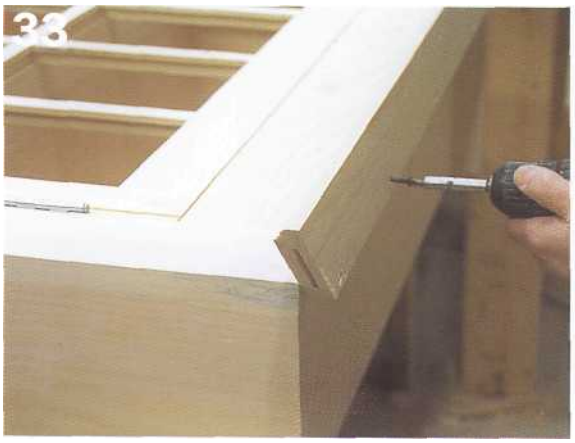

Step 33 Next, make the top moulding pieces. These pieces have a moulded edge and are cut to fit with 45° angles that are biscuited at the front corners. They are attached to the case with 1 1/4"" screws.

Step 34 Make the cove moulding and fit it to the case.

Step 35 Next, mill the backboards and create the 5/16" x 3/8" rabbet for the shiplap detail. While I sometimes make this with the table saw, here I used the router and a rabbeting bit.

step 36 Sand the piece completely, knock down the edges with coarse-grit sandpaper and send this to the finish room. This is to be a painted piece, but I begin with a cherry aniline dye.

step 37 With the stain dry, apply a couple of coats of shellac. Here I apply a coat of paint that has had fine sawdust mixed into it. Brush it on and as it becomes tacky, remove some paint and most of the sawdust by wiping with a wet rag.

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Step 38 paint the interior of the cupboard, and on the exterior add a coat of dark wax to add depth and age to the piece.

Step 39 Next, cut the glass and glaze the upper door. I use Durham's Water Putty for the yellowing effect.

Step 40 Reinstall the doors. Add the hardware and the door catch in the lower door. Here you see how the catch is attached and works from the inside.

Step 41 The backboard is stained on the exterior and painted on the inside. It is nailed using reproduction nails.

t i p When setting up to cut the glass door grid pieces, I find it helpful to use a new scrap fence with my miter gauge. The piece acts as a backer and the new cut helps to line up your cut.

18TH-CENTURY HANGING CUPBOARD

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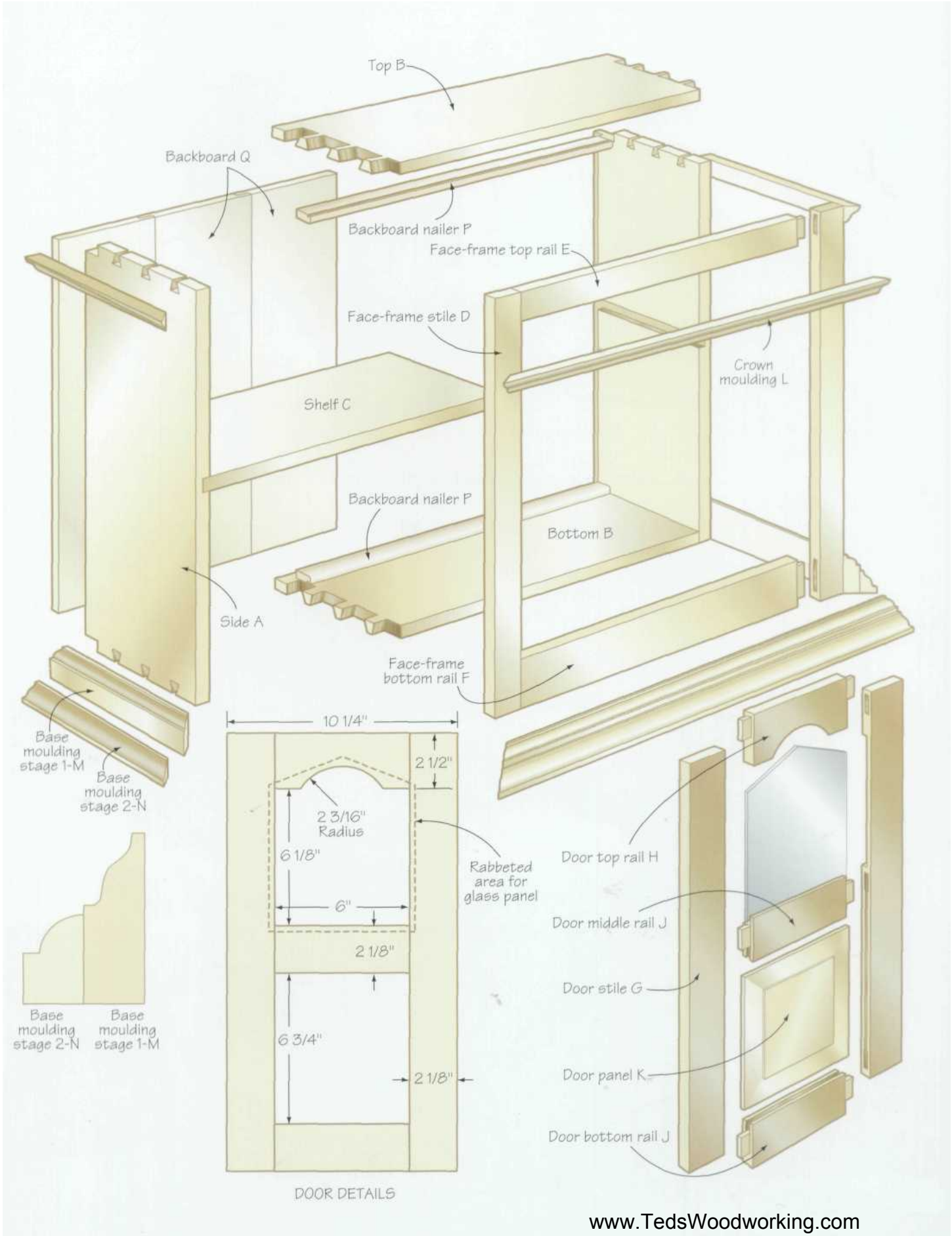

DOOR DETAILS

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18TH-CENTURY HANGING CUPBOARD

inches (millimeters)

REFERENCE	QUANTITY	PART	STOCK	THICKNESS	(mm)	WIDTH	(mm)	LENGTH	(mm)	COMMENTS
A	2	sides	walnut	3/4	(19)	9 1/4	(235)	24	(610)	
B	2	top and bottom	walnut	3/4	(19)	9 1/4	(235)	24 1/2	(623)	
C	1	shelf	walnut	3/4	(19)	8 1/2	(216)	23 1/2	(597)	
D	2	face-frame stiles	walnut	3/4	(19)	2	(51)	24	(610)	
E	1	face-frame top rail	walnut	3/4	(19)	1 5/8	(41)	22 1/2	(572)	1" (25) TBE
F	1	face-frame bottom rail	walnut	3/4	(19)	2 3/4	(70)	22 1/2	(572)	1" (25) TBE
doors										
G	4	stiles	walnut	3/4	(19)	2 1/8	(54)	19 5/8	(499)	
H	2	top rails	walnut	3/4	(19)	2 1/2	(64)	8 1/2	(216)	1 1/4" (32) TBE
J	4	middle and bottom rails	walnut	3/4	(19)	2 1/8	(54)	8 1/2	(216)	1 1/4" (32) TBE
K	2	panels	walnut	5/8	(16)	5 5/8	(143)	7 3/8	(188)	5/16" (8) TAS
mouldings										
L		crown moulding	walnut	3/4	(19)	3/4	(19)	5 lf	(1524)	
M		base moulding, stage 1	walnut	5/8	(16)	1 3/4	(45)	5 lf	(1524)	
N		base moulding, stage 2	walnut	5/8	(16)	1	(25)	5 lf	(1524)	
P	2	backboard nailers	poplar	5/8	(16)	1 3/4	(45)	22 7/8	(581)	
Q	1	backboard	walnut	7/16	(11)	22 1/2	(572)	23 7/8	(606)	made from various pieces
R	1	door catch	walnut	1/2	(13)	3/4	(19)	3	(76)	
S	1	lock catch	walnut	1/4	(6)	3/4	(19)	2	(51)	

Note: TBE = tenon both ends; TAS = tenon all sides.

hardware

2 pairs	2" × 2" (51mm × 51mm) Wrought-iron butterfly hinges	item #HF-12	Horton Brasses
1	Brass half-mortise cabinet lock	item #LK-9	Horton Brasses
	1 1/2" (38mm) Clout or shingle nails	item #N-7	Horton Brasses
2 pieces	Full-restoration glass, cut to fit		Bendheim
	1/4" (6mm) Square pegs, red oak		
	Button lac shellac		
	Behlen Wool-Lube		
	Olde Century Colors acrylic latex in Brierwood Green		
	Paste wax		
	Glue		
	#0000 Steel wool		

Step 1 Cut the sides, top and bottom to size according to the materials list. Then create the pins of the dovetail joint on the top and bottom pieces.

Step 2 Cut the corresponding tails into the side pieces.

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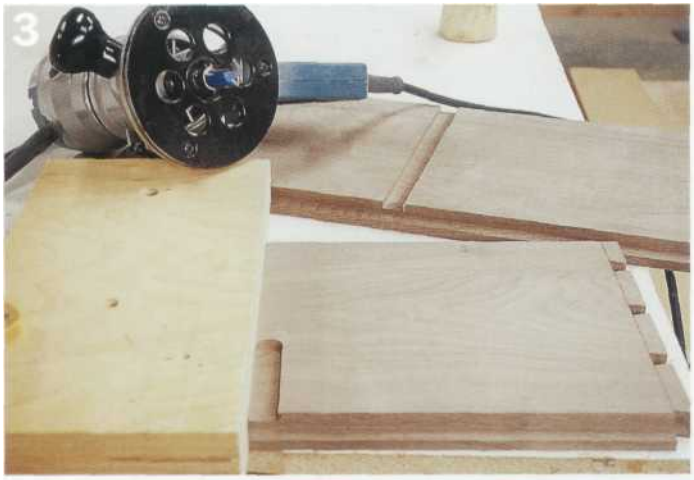
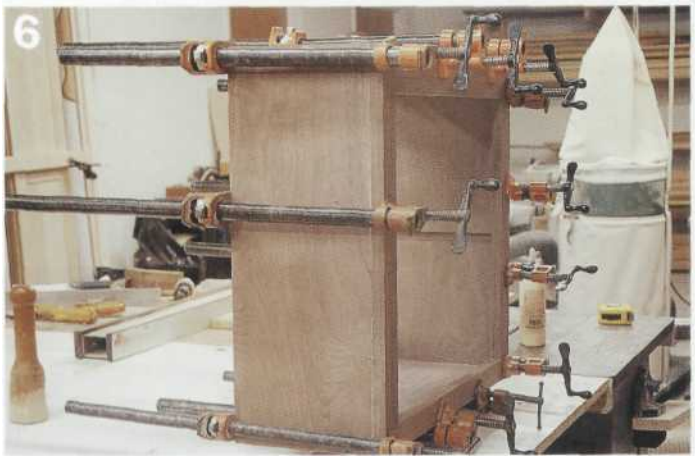


Step 3 With the dovetails complete, cut the 1/2" x 1/2" rabbet for the backboards, then locate and create the 3/4" dado for the shelf. Assemble the dovetailed box.

step 4 Mill the parts for the face frame and create the mortise-and-tenon joinery to assemble the frame.

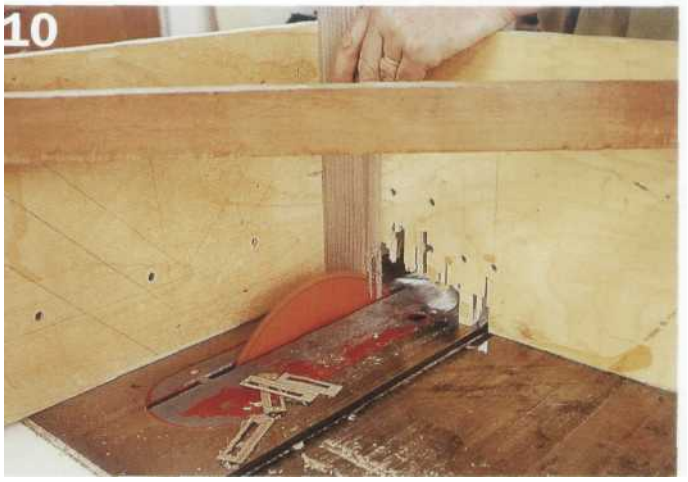
step 5 Assemble the face frame, checking to assure that it is square.



step 6 Using glue and plenty of clamps, attach the face-frame assembly to the dovetailed box.

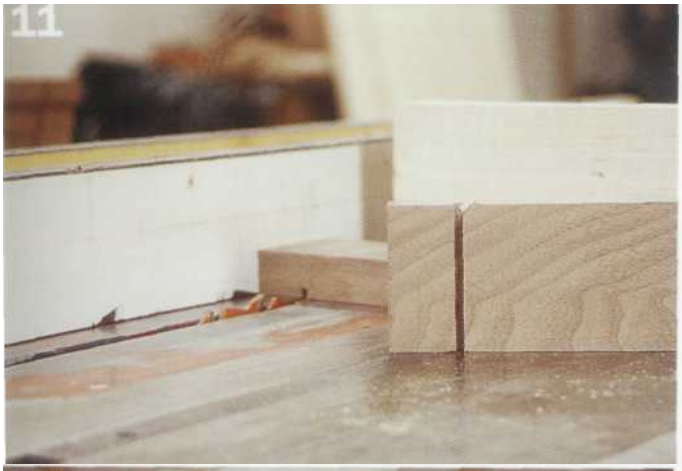
step 7 Slide the shelf into place and use 1/4" square pegs to affix the shelf. I use red oak for the pegs.

step 8 Next, cut the door pieces according to the materials list, lay out the radius on the top rail and create the tombstone effect. Use a 3/16" roundover bit on the inside edge of all pieces, making sure to run both edges on the middle rail of each door.

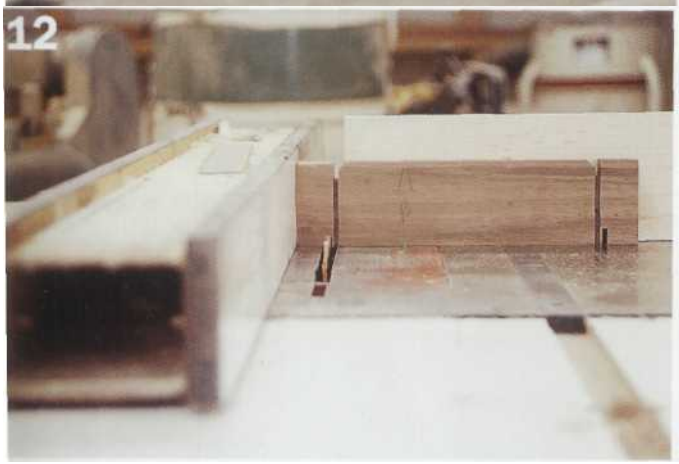


step 10 Use a tenoning jig to remove the waste material where the top and bottom rails meet the stiles.

step 11 Create the same 45° cut in each rail at the required location, then reset the blade to 90° and complete the cul that defines the cheeks.



Step 9 Lay out the location of the rails on all the door stiles, then cut the mortises as seen on the pieces. Set the saw blade to 45° and cut just to the shoulder of the roundover. There is one cut for each top and bottom rail, and two cuts for the middle rail. The area for the middle rail must be nibbled away and cleaned up with a chisel.



Step 12 Next, adjust the lade height to 3/8" and make the cut that defines the shoul-ders, remembering that this is a haunched tenon (offset the tenon by 3/8").

Step 13 Return to the tenoning jig to complete the cuts for the tenon.

step 14 With all the mortises and tenons finished, set the blade to cut a 1/4"-wide by 3/8"-deep groove on the inside of all pieces and both sides of the middle rail.

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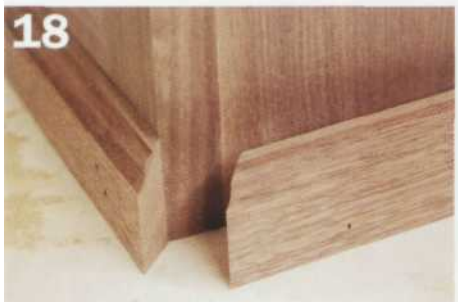
Step 15 Dry fit the door pieces and make any adjustments necessary. Take the measurement for the panels and cut to size, adding the 5/16" on all sides. Moving the fence to the left side of the blade, set the blade angle to 12° and make the cut that creates the raised-panel effect. Here you can see that I have raised the blade through a scrap of plywood for safety. The lower edge has to be able to fit into the 1/4" groove created in the stiles and rails, and not fall into the saw insert throat.

step 16 Glue the door parts and allow to dry. When dry, mark a 3/8" line (shown here in white) to denote the area for the glass. With a straightedge and ½" pattern bit in the router, remove the waste material.

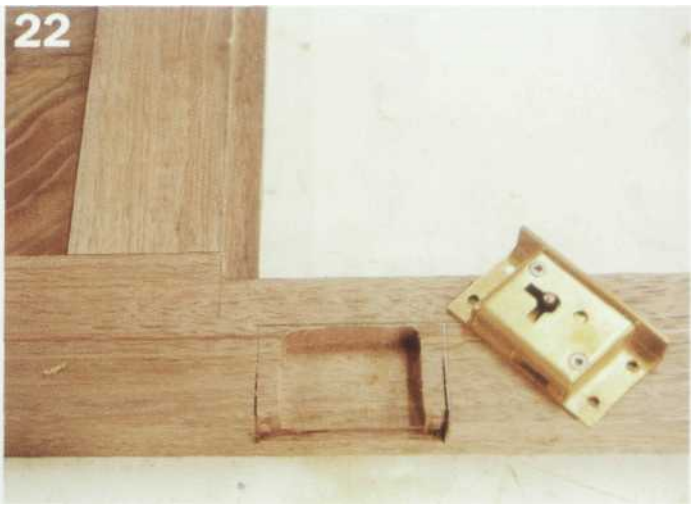
step 17 This is how the glass area should look when complete.



step 18 Mill the pieces that are to become the case mouldings. The stage 1 moulding for the base is routed with a Roman ogee bit. Cut the miters and nail the pieces to the case.

step 19 Using a 1/2" roundover bit to form the edge of the stage 2 base moulding, create the piece and nail it to the stage 1 moulding to complete the base moulding.

step 20 The crown is made with a classical ogee bit and sim-ply nailed to the top edge of the case. It's easier to attach the crown when the case is turned upside down on your work surface.



Step 21 The backboard nailers are glued and nailed to the top and bottom of the case. Here you can see a groove cut into the bottom of the nailers to eliminate any glue squeeze-out.

step 22 Install the lock into your operable door, then fit the doors into place and install the hinges, making sure to allow equal spacing around the doors.

step 23 Using the biscuil joiner, make a groove in the bottom edge of the shell, just behind the stile and 1/4" from the shell front, to accept the door catch. Next, mark the location of the lock strike and create that catch. It is also possible to purchase an angled strike plate from the lock supplier to eliminate this procedure.

step 24 Cut the stock for the backboards and mill the halt-lap joinery for the pieces.

step 25 Remove all hardware and mark each hinge location. t*he* piece is ready to finish. This cupboard is finished with Eve coats of button lac shellac that is sanded after three coats. After the two additional coats are applied and dry, it is hand rubbed with #0000 steel wool and Behlen Wool-Lube, which aids in smoothing the surface. The interior is painted with two coals of Olde Century Colors acrylic latex in Brierwood Green. Next, nail the backboards into place.

step 26 Install the glass into the doors. Reinstall the hinges into the exact same locations, reinstall the lock and apply a coat of paste wax. Your hanging cupboard is now complete.

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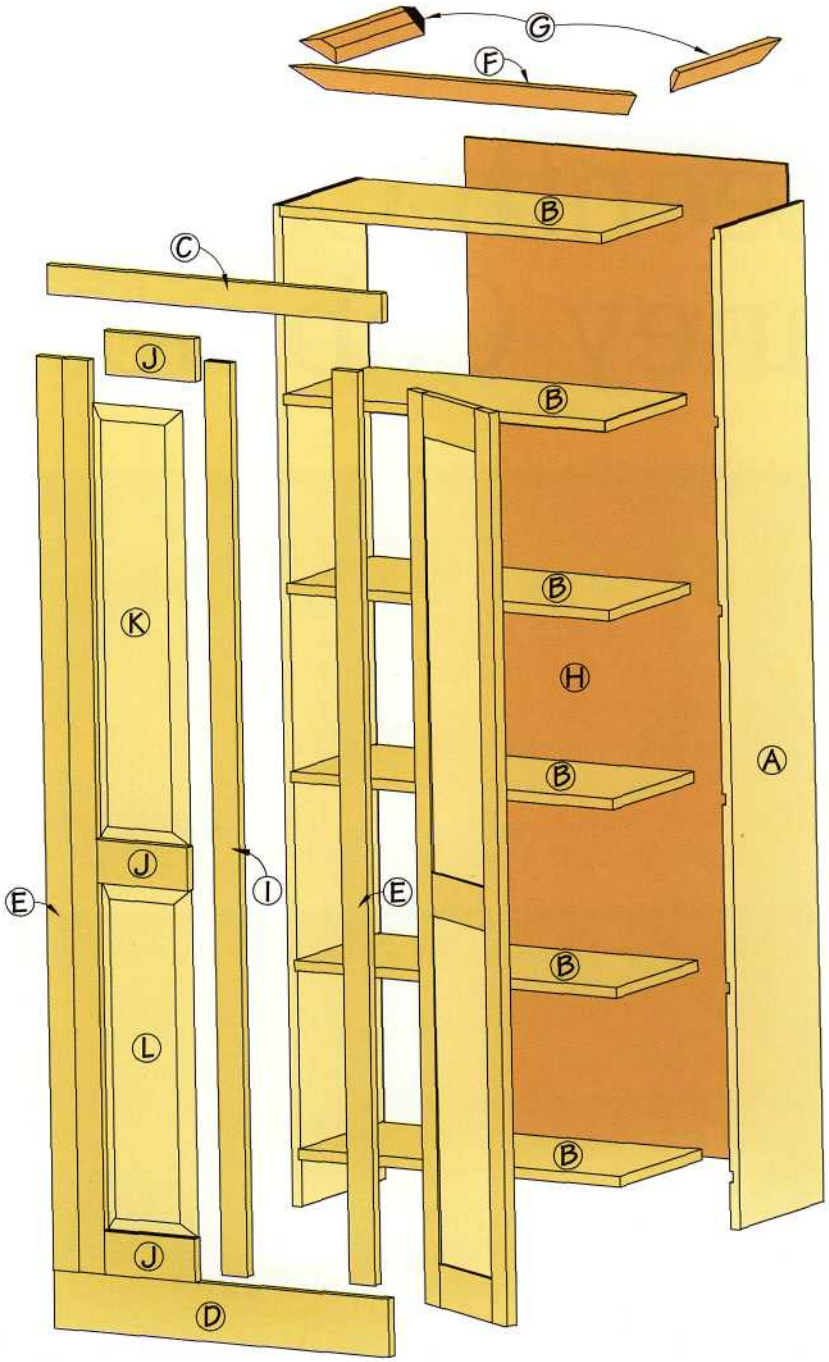
Eighteenth-Century Chimney Cabinet

these pieces were made to fit nicely beside a fireplace mantle. Some were little more than 12" wide while some were a couple of feet or more.

Today they make great conversation pieces, interesting projects and they sell well. This version is a copy of one made around the turn of the nineteenth century.



MATERIALS LIST

Chimney Cabinet

No.	*Letter*	*Item*	*Dimensions T W L*
2	A	Sides	¾″×11¼″×69″
6	B	Shelves, Bottom and Top	¾″×11¼″×23″
1	C	Trim Top	¾″×2″×24″
1	D	Trim Bottom	¾″×4″×24″
2	E	Trim Uprights	¾″×2″×63″
1	F	*Crown	¾″×2½″×27″
2	G	*Crown	¾″×2½″×14″
2	H	Back	¼″×24″×69″
4	I	Door Stiles	¾″×2″×69″
6	J	Door Rails	¾″×3″×7″
2	K	Door Panels	¾″×7½″×30½″
2	L	Door Panels	¾″×7½″×24½″

*allows for trimming

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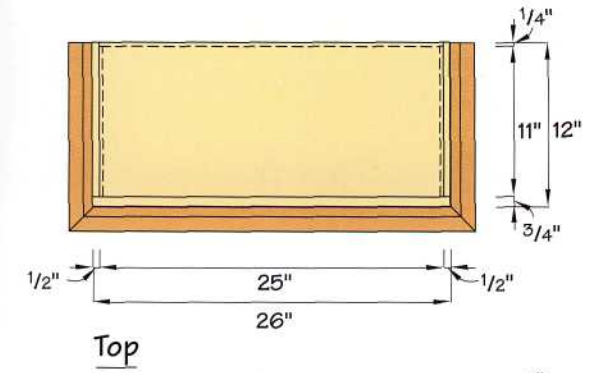
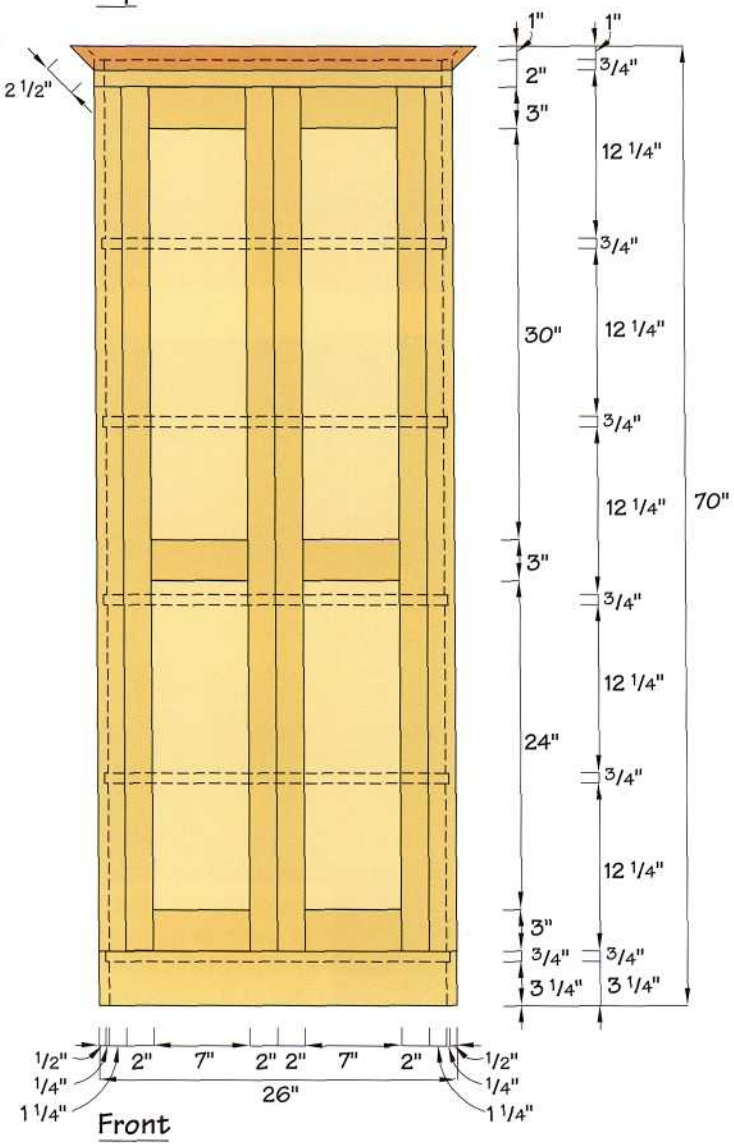
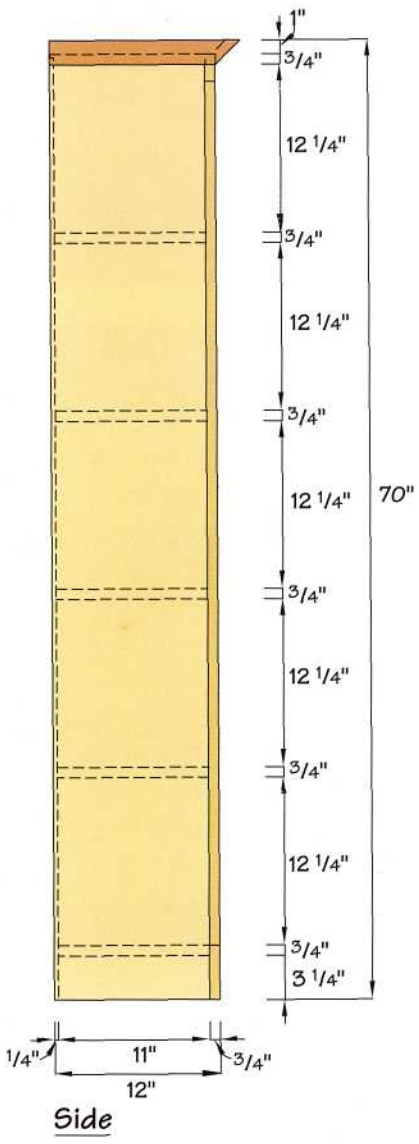


Top



Front



Side

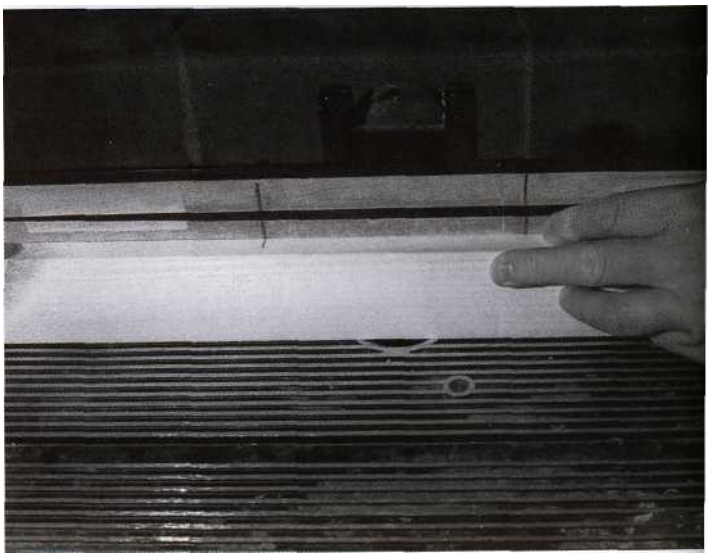
CONSTRUCTION OUTLINE

This is a simple project. With the exception of the raised-panel doors, construction is quite straightforward and shouldn't take more than a couple of weekends.

The sides are made from single pieces of stock, dadoed to take the six shelves, including top and bottom.

When making the doors, you can fasten the rails and stiles together with lap joints or biscuits. As you can see, I prefer to use biscuits. It's quick, simple and strong.

These can be set equidistant apart, or you can vary them to allow room to store larger objects at the bottom and smaller ones at the top. The trim can be fastened to the carcass with glue and nails or with biscuits and glue. The crown is constructed from three pieces of stock, the edges beveled to 45°, the ends mitered then glued and screwed to the top. The back is made from a single piece of lauan plywood, but you could go the distance and use 1/2" tongue-and-grooved boards, as you would likely find on an original piece. The two doors are constructed with raised panels and secured to the carcass with reproduction "H" hinges, stripped and aged for authenticity. For the finish I chose dark blue paint over white and a dark stain.



To mill the grooves in the edges of the rails and stiles that will house the door panels, you can use your router table and a 5/16" bit, or your table saw. I run a piece of table along the top of the back fence and, to ensure the groove is consistently in the proper place, mark the start and stop points as you see here.

BUILDING THE CABINET

STEP 1. Cut all the pieces to size.

STEP 2. Mill the dadoes to the two sides as laid out in the drawing.

STEP 3. Sand both faces of the sides smooth and apply your chosen stain—it's much easier to do this now than when assembly is complete.

STEP 4. Sand both surfaces of all four shelves, bottom and top, and then apply your stain.

STEP 5. Using glue, clamps and toenails, assemble the carcass. Check the diagonals to make sure the structure is square, then set it aside until the glue is fully cured.

STEP 6. Sand the trim smooth and apply stain.

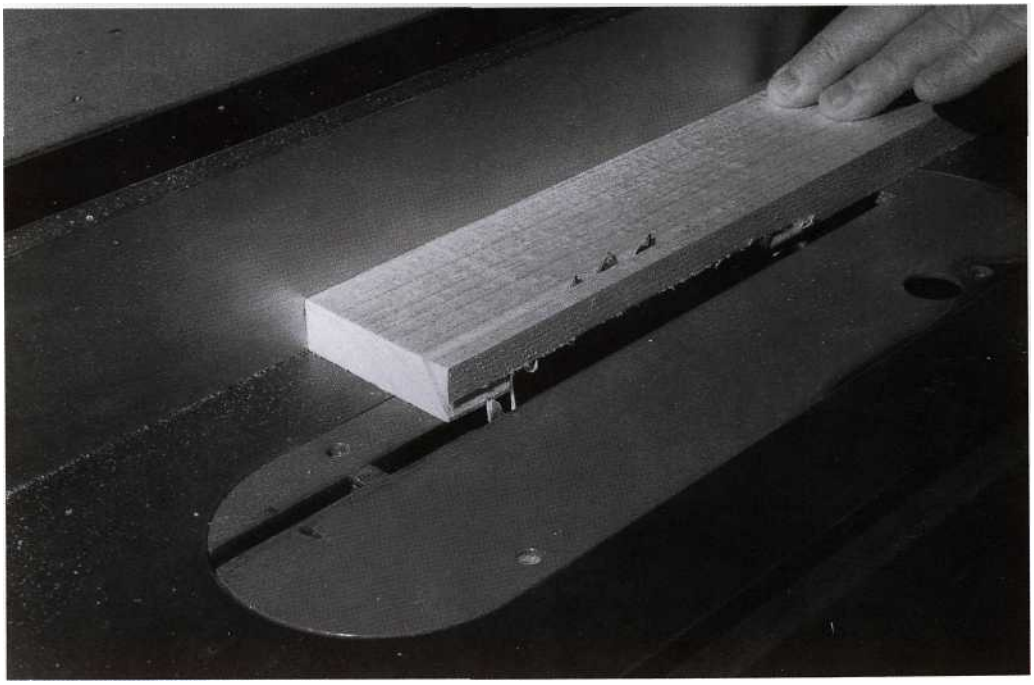
STEP 7. Once the clamps are removed, lay the carcass on its back, set the trim in place and mark for biscuit slots. It's best if you allow 8" or 9" between biscuits.

STEP 8. Mill the biscuit slots.

STEP 9. Glue and clamp the trim in place and set the structure aside until the glue is fully cured.

The door panels are quite small and easily handled on the table saw. Set the angle of the blade to between 15° and 17°, and then set the depth of cut so that the tip of the blade just breaks through the surface of the panel.

To make the crown, trim the edges of all three pieces of stock to 45°. Do this so that both angles are on the same side so that, when you look at the end grain, you see a triangle with a flat top.



STEP 10. Use either your router with a 5/16" straight-cutting bit or your table saw to mill 3/8"-deep grooves to the inner edges of the rails and stiles that will make up the doors.

STEP 11. Lay out the rails and stiles and mark for biscuit slots. You can use lap joints if you like, but you'll need to adjust the length of the rails to maintain the outer dimensions of the doors.

STEP 12. Mill the biscuit slots.

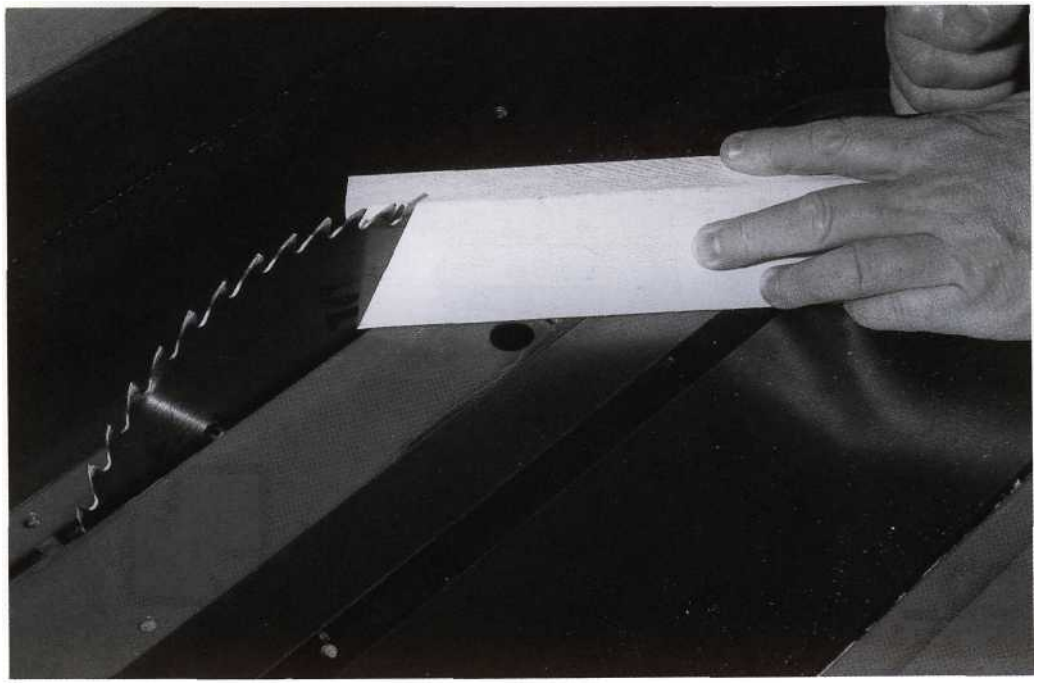
STEP 13. Dry fit the rails and stiles and measure the width and height between the grooves to ensure the panels will fit properly.

STEP 14. If necessary, trim the panels to size.

STEP 15. Sand the rails and stiles smooth and apply your stain.

STEP 16. Glue and clamp the rails and stiles, *one side only,* dry fit the other and set them aside until the glue is fully cured.

STEP 17. Set your table saw to cut at an angle of 17°, the



To form the miters on the ends of the crown, set the miter gauge to 45°, place one of the mitered edges against the face of the miter gauge and the other down on the saw table, and then gently make the cut.

rip fence at 1/4", and mill the bevels to the edges of the panels.

STEP 18. Sand the panels smooth, paying close attention to the bevels, then apply the stain.

STEP 19. When the glue is fully cured, remove the clamps from the frames and remove the dry-fitted stiles.

STEP 20. Slide the panels into place in the now-open frames, glue and clamp the remaining stiles in place, and set the completed doors aside to allow the glue to fully cure.

STEP 21. Use a beading bit in your router table to detail the edges of the three pieces of stock that will make the crown, then cut the miters.

STEP 22. Set the crown in place on the carcass, check for size, make any necessary adjustments then glue and screw the pieces in place.

STEP 23. Set the doors in place and make any necessary adjustments for a good fit.

STEP 24. You've now reached the point where you'll need to complete the finishing process (see right).

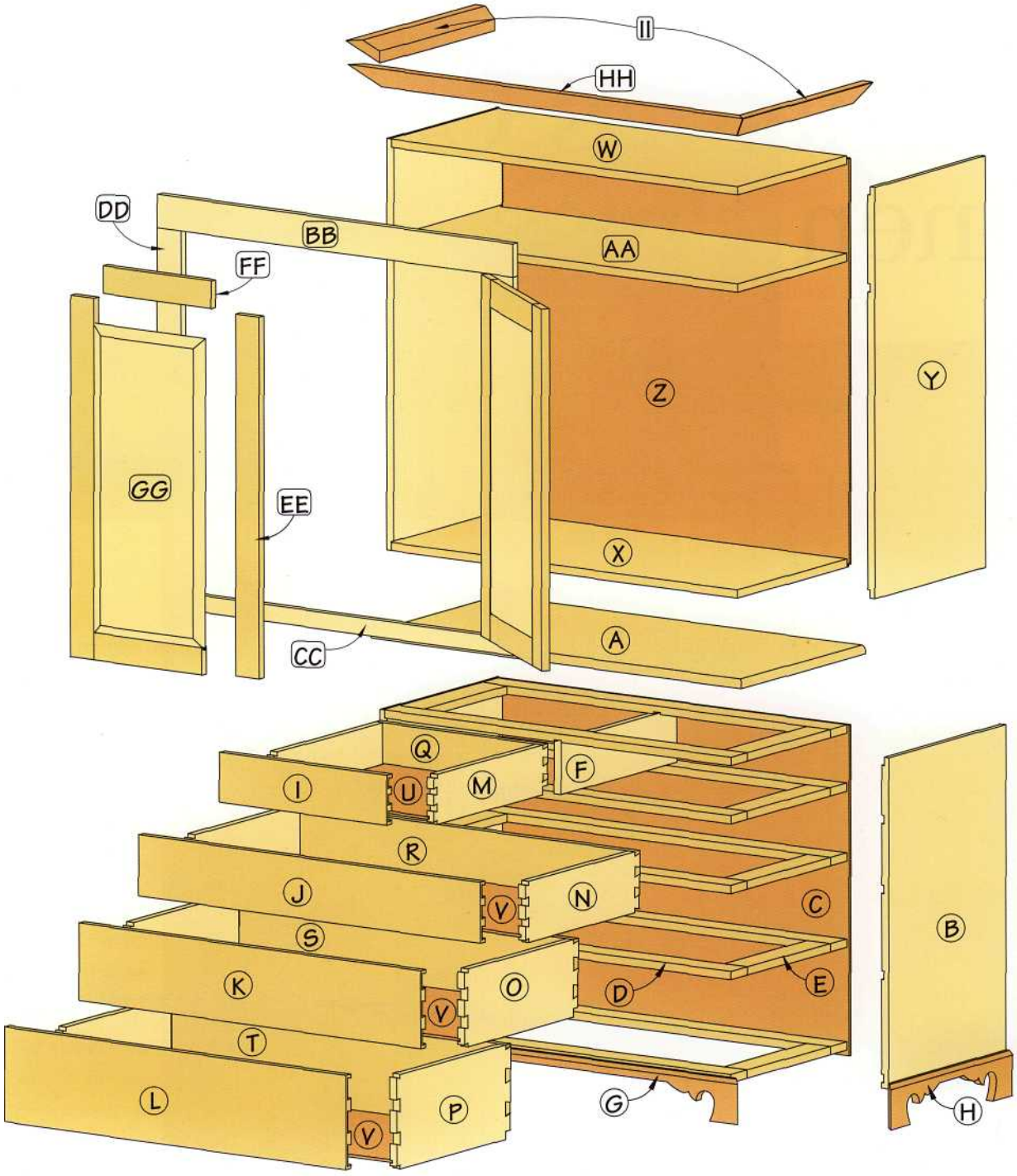
STEP 25. When finishing is complete, set the doors in place and attach the hinges and knobs; the project is complete.

FINISHING

If you've done your staining as you worked your way through the project, all that now remains to complete the finish is to do some light distressing around the trim, the corners and edges of the doors, a little final sanding with a fine-grit paper and then add the paint. The choice between colors, one over the other, is a personal one; I used dark blue over white. Finally, to complete the illusion, you'll need to apply some sort of antiquing glaze. I recommend you use the polyurethane-pigment combination described in chapter three.

Bachelor's Chest/ linen Press

This bachelor's chest was a prized piece of furniture during the eighteenth century and has remained so. The design, a linen press over a chest of drawers, is English and was imported to America more than 200 years ago. It's a large, functional and attractive piece. The one I have chosen is a copy of one made in Connecticut circa 1830. You can make it with three shelves in the press section, or you can leave two



of them out and use the piece as an entertainment center; the top shelf will nicely accommodate a VCR and the large opening a 19" television.

CONSTRUCTION OUTLINE

The piece is made in two parts, and for the sake of mobility and convenience, the parts should remain separate, the upper section freestanding on the lower section. For such a seemingly complicated piece, construction is relatively simple with a couple of exceptions.

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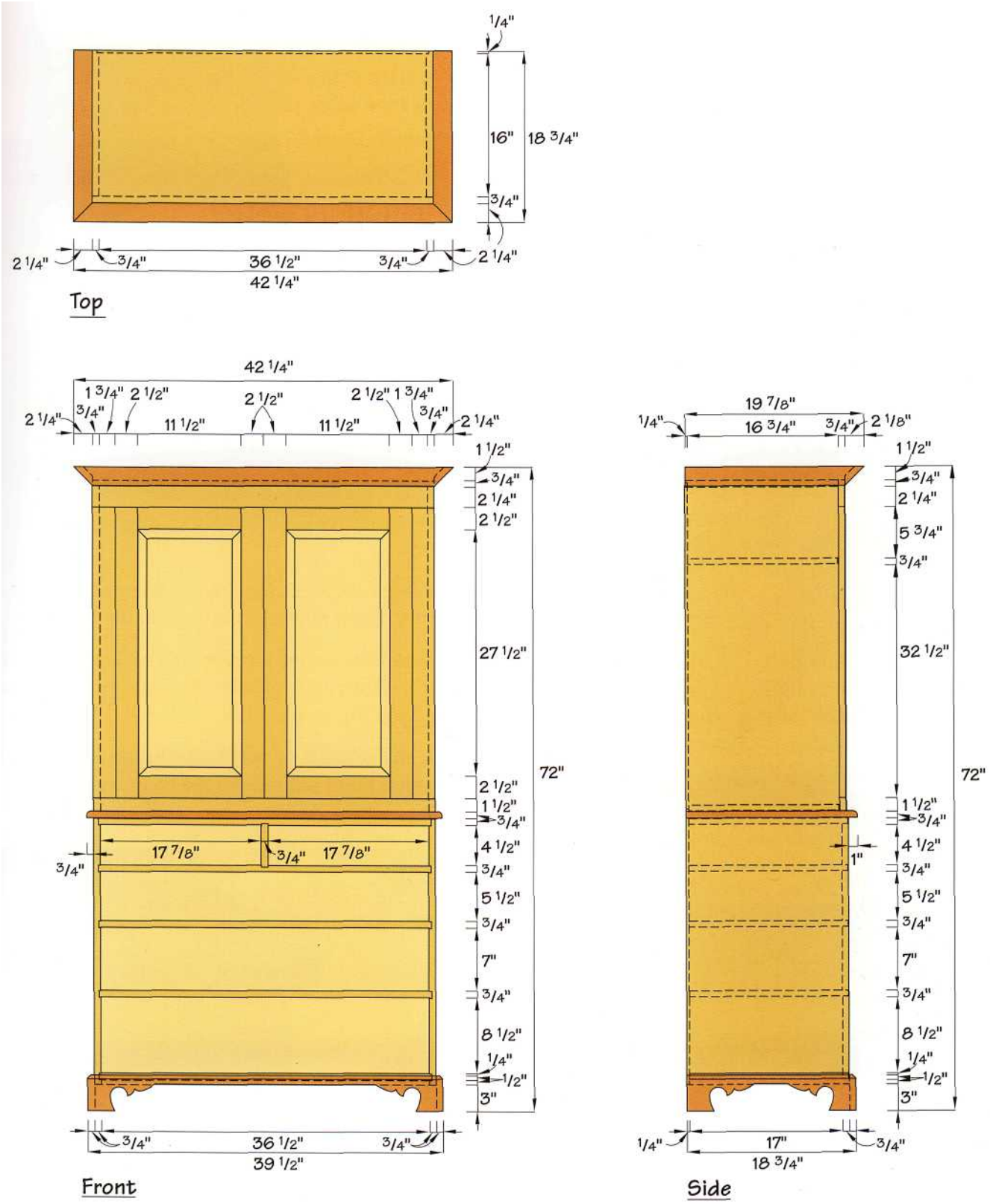
The original was made from walnut. I don't think pine was ever used. Still, there's no reason why it shouldn't be used. I decided to use furniture grade throughout.



It's stable, predictable, easy to work and takes stain well. The upper section, the press, is no more than a cupboard with a single shelf (three, if you decide not to make it as an entertainment center). The shelves are dadoed into its sides; the top and bottom are rabbeted into the sides; the plywood back is also set into rabbets. The trim is fastened to the front with biscuits and glue, and the crown is fastened to the top with glue and screws. The hardware consists of reproduction brass knobs and "H" hinges.

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MATERIALS LIST

Bachelors Chest

No.	*Letter*	*Item*	*Dimensions T W L*
Drawer Section			
1	A	Top	¾″ × 19″ × 39½″
2	B	Case Sides	¾″ × 18″ × 29¾″
1	C	Case Back	¼″ × 29¾″ × 37½″
10	D	Web Parts	¾″ × 2½″ × 37″
10	E	Web Parts	¾″ × 4″ × 12¾″
1	F	Drawer Partition	¾″ × 4½″ × 17¾″
1	G	*Foot	¾″ × 4″ × 42″
2	H	*Feet	¾″ × 4″ × 22″
2	I	Drawer Fronts	¾″ × 4½″ × 17⅝″
1	J	Drawer Front	¾″ × 5½″ × 36½″
1	K	Drawer Front	¾″ × 7″ × 36½″
1	L	Drawer Front	¾″ × 8½″ × 36½″
4	M	Drawer Sides	¾″ × 4½″ × 17½″
2	N	Drawer Sides	¾″ × 5½″ × 17½″
2	O	Drawer Sides	¾″ × 7″ × 17½″
2	P	Drawer Sides	¾″ × 8½″ × 17½″
2	Q	Drawer Backs	¾″ × 4″ × 17⅝″
1	R	Drawer Back	¾″ × 5″ × 17⅝″
1	S	Drawer Back	¾″ × 6½″ × 17⅝″
1	T	Drawer Back	¾″ × 8″ × 17⅝″
2	U	Drawer Bottoms	¾″ × 16⅝″ × 17½″
3	V	Drawer Bottoms	¾″ × 35½″ × 17½″
Press Section			
1	W	Top	¾″ × 17″ × 37″
1	X	Bottom	¾″ × 17″ × 37″
2	Y	Sides	¾″ × 17″ × 37″
1	Z	Back	¼″ × 37½″ × 36½″
1	AA	Shelf	¾″ × 16½″ × 37″
1	BB	Trim	¾″ × 3″ × 38″
1	CC	Trim	¾″ × 1½″ × 38″
2	DD	Trim	¾″ × 2½″ × 32½″
4	EE	Door Stiles	¾″ × 2½″ × 32½″
4	FF	Door Rails	¾″ × 3″ × 11½″
2	GG	Door Panels	¾″ × 12″ × 28″
1	HH	*Crown	¾″ × 3″ × 43″
2	II	*Crown	¾″ × 3″ × 20″

*Extra length added for cutting

The bottom section is no more than a simple chest of drawers with web frames dadoed into the sides. The top is a board constructed from several smaller pieces of stock; the grains are alternated for stability. The feet are cut from single pieces of stock. The drawers are constructed using half-blind and through dovetails.

BUILDING THE DRAWER SECTION

STEP 1. Cut all the pieces to size and run the edges through the jointer.

STEP 2. Build the boards that will make the sides, top and bottom.

STEP 3. Build the four web frames as laid out in the drawing—you can use biscuits, as I did, or lap joints. Note the offsets, and also the frame, which has an extra stretcher to carry the separator that will support the drawers.

STEP 4. Mark the sides for stopped dadoes and top and bottom stopped rabbets as laid out in the drawing.

STEP 5. Mill the stopped dadoes and rabbets. I used my router, a 3/4" mortising bit and a T-square jig as described in the Shop.

STEP 6. Mill 1/4"-deep rabbets to the inside back edges of both sides; these will receive the plywood back.

When sanding the butt joints on the side section, or any butt joints, use your belt sander and work first across the joint and grain in a diagonal direction, and then finish with the belt sander by working the machine along the direction of the grain.

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Finish sanding with your random orbital sander, making sure to remove all the tool and belt marks, especially on the knots.

STEP 7. Glue, clamp and toenail the webs and bottom board to the sides; make sure everything is square, and then set the structure aside until the glue is fully cured.

STEP 8. Glue and screw the drawer separator in place between the top and the top web frame as laid out in the drawing.

STEP 9. Set the top board in place on the top web frame and fasten it in place using ten no. 6 X 1 5/8" screws: four at the back and front, and one at each end.

STEP 10. Use the scale pattern to mark the feet details.

STEP 11. Cut the miters to each end of the four pieces of stock that will make the feet.

STEP 12. Use either your band saw or jigsaw to cut out the feet.

STEP 13. From the inside, glue and screw the feet to the bottom of the carcass, making sure they are level and true.

STEP 14. Make sure all the pieces for all five drawers are exactly the right size, then using half-blind and through dovetail joints, build the drawers. You can see how in the Shop Tip.

BUILDING THE PRESS SECTION

STEP 15. Build the boards that will make the sides, shelf (or shelves), top and bottom.

STEP 16. Mark the sides for dadoes and top and bottom rabbets as laid out in the drawing.

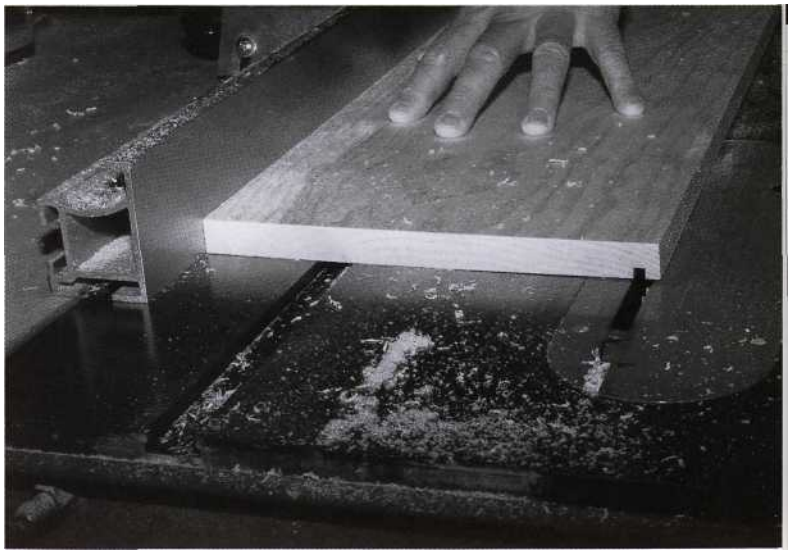
STEP 17. Mill the dadoes and rabbets.

STEP 18. Mill 1/4"-deep rabbets to the inside back edges of both sides to receive the plywood back.

STEP 19. Glue, clamp and toenail the shelf (or shelves), top and bottom to the sides; make sure everything is square, then set the structure aside until the glue is fully cured.

STEP 20. Lay the carcass flat on its back on the bench, put the trim in place and mark for biscuit slots. If you don't use biscuits you can glue, clamp and nail the pieces in place.

STEP 21. Remove the trim and mill the biscuit slots.



Use your table saw or router table to mill the grooves along the front and sides of the drawer sections.

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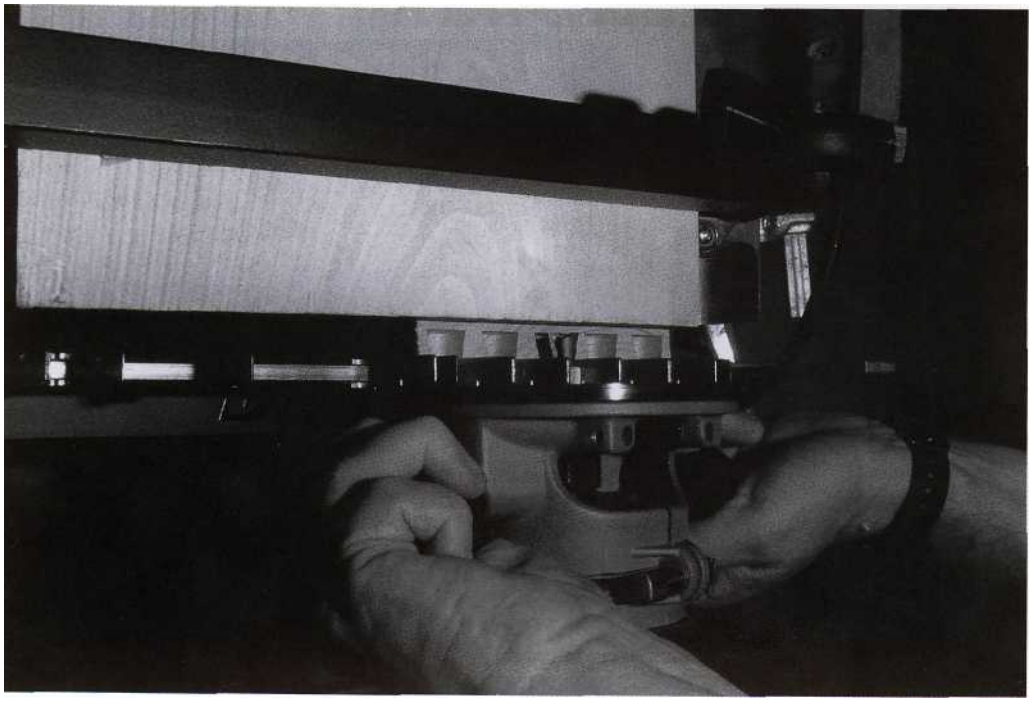
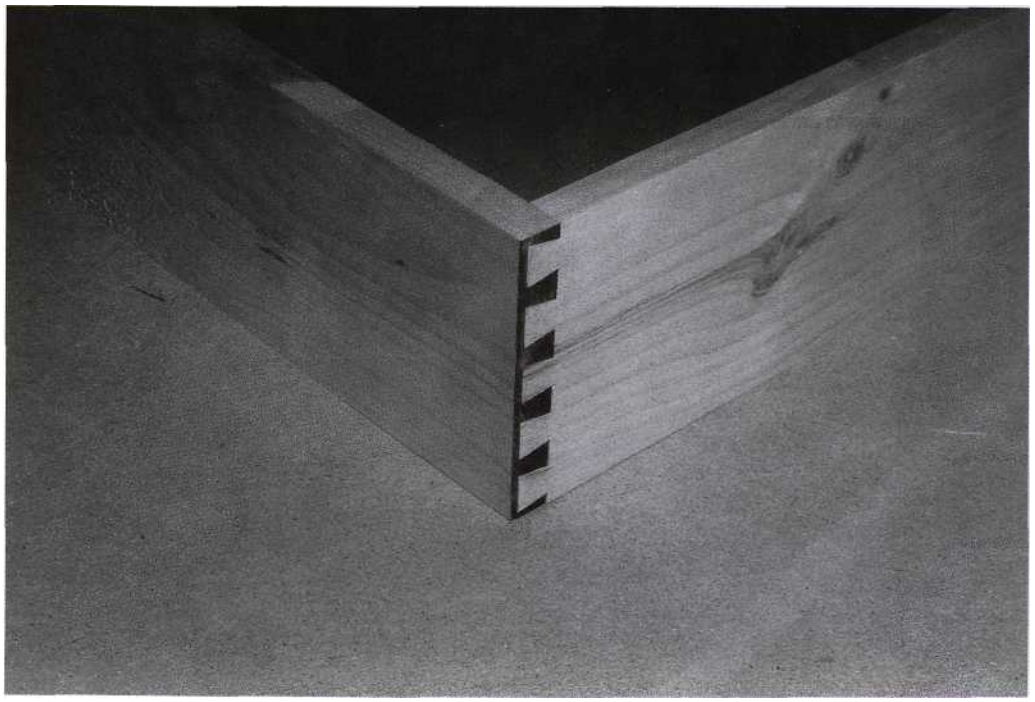


Milling blind dovetail joints is a simple job if you have a dovetail jig. It just takes attention to detail and an effort to make sure the stock is properly placed in the jig, touching all the stops and fingers. Just a small deviation will produce a sloppy joint.

There's nothing quite so satisfying as the perfectly finished joint.



STEP 22. Glue and clamp the trim in place. If you've used nails, now's the time to set the heads and fill the holes.

STEP 23. Build the two doors as laid out in the drawing and the Shop Tip.

STEP 24. Set your table saw to cut at an angle of 45° and a depth of 1 1/4" and cut the bevels to the three pieces of stock that will make the lower section of the crown.

STEP 25. Cut the miters to the ends of the crown.

STEP 26. Use a 1/2" roundover bit in your router to round the front edges of the three pieces that will make the upper section of the crown.

STEP 27. Glue the miters, set the upper section of the crown in place and secure to the top of the carcass using nine no. 6 X 1 5/8" screws: four along the front and three at each end.

STEP 28. Apply glue to the edges and miters of the three pieces of the lower section of the crown, set them in

place, then secure them with a couple of brads.

STEP 29. Use small brads to attach the plywood back to the back of the unit.

STEP 30. Apply a coat of stain to both sections, chest and press, then move on to the finishing process.

STEP 31. After finishing is complete you can attach the knobs to the doors, the pulls to the drawers, and then fit the doors to the cupboard section using reproduction hinges.

FINISHING

How to finish a nice piece such as this is a tough decision. I decided to keep things relatively simple. Thinking that it would be used in a bedroom and therefore would not be subject to heavy traffic and wear and tear, I decided to go with a little light distressing—just a ding or two, here and there—a very dark stain (I used Jacobean by Minwax) and a couple of coats of shellac. Finally, I finished the process with a couple of coats of beeswax buffed to a shine.

SHOP TIP

Cutting Dados With a Router

You can cut dados a number of ways: on the table saw, on a radial arm saw, or you can do as I do and use your router.

Over the years, I've found the router to be the best, most reliable and most convenient way to cut dados. You'll find it very convenient not having to break down your table saw or radial arm to fit the stacked dodo head. You'll also find the finished product is much better. The bottom of a dado cut with a router is dead square and flat, and the two sections will fit tightly and squarely together, making final squaring of the piece extremely simple.

To mill dados with a router, you'll need a couple things. First, obviously, you'll need an appropriate bit: ¾″ × 1″ if you're using standard stock—one with carbide tips works best.

Next, you'll need a jig. I use a simple, home-made T square. Make the T long enough so the router will pass through it the first time you use it. This makes setting the square for future cuts extremely simple.

Finally, you'll need a clamp to hold the square in place while you make the cut. I love the little, quick-release clamp you see in the photo. It's made by Bessy, and makes setting and re-setting the square quick and easy.

Finally, set the depth of cut on your router to ¼″, or whatever depth you prefer, clamp the square in place and make the cut.

I've cut thousands upon thousands of dados, in stock of widths from 3″ or 4″ to as much as 3′ or even more, always with the very best results. I wouldn't even consider doing it any other way. Once you get used to it, it's very quick and easy to do.

Late Eighteenth-Century Welsh Dresser

The Welsh dresser is something of an enigma. There seems to be little restriction as to size and form of this traditional piece. I've seen huge examples. One, I recall, in the Childswickham Arms, one of the oldest pubs in England, is some eight feet wide and seven feet tall, with shelves stacked with antique pewter plates, pots and jugs. Another, imported into the United States from England, for sale in an antique

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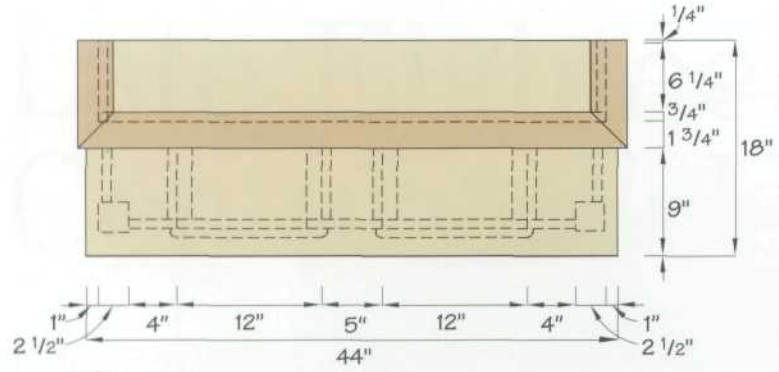
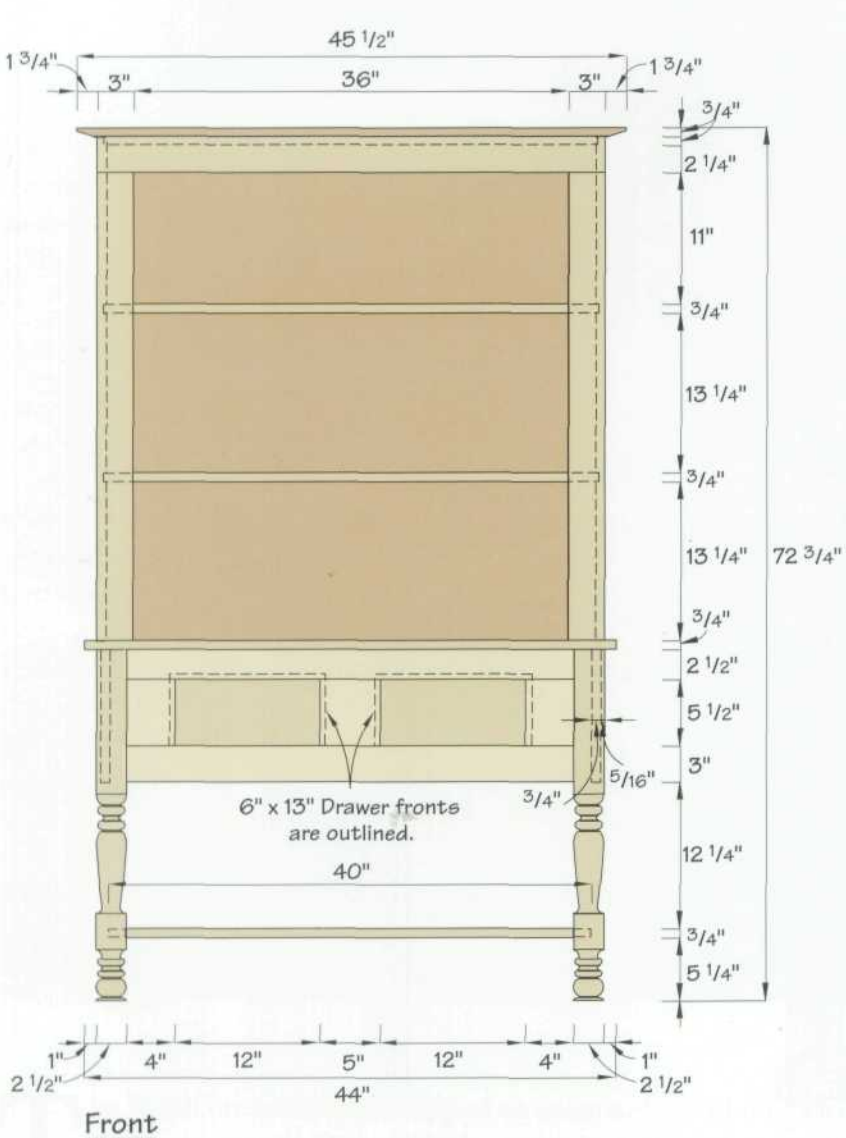
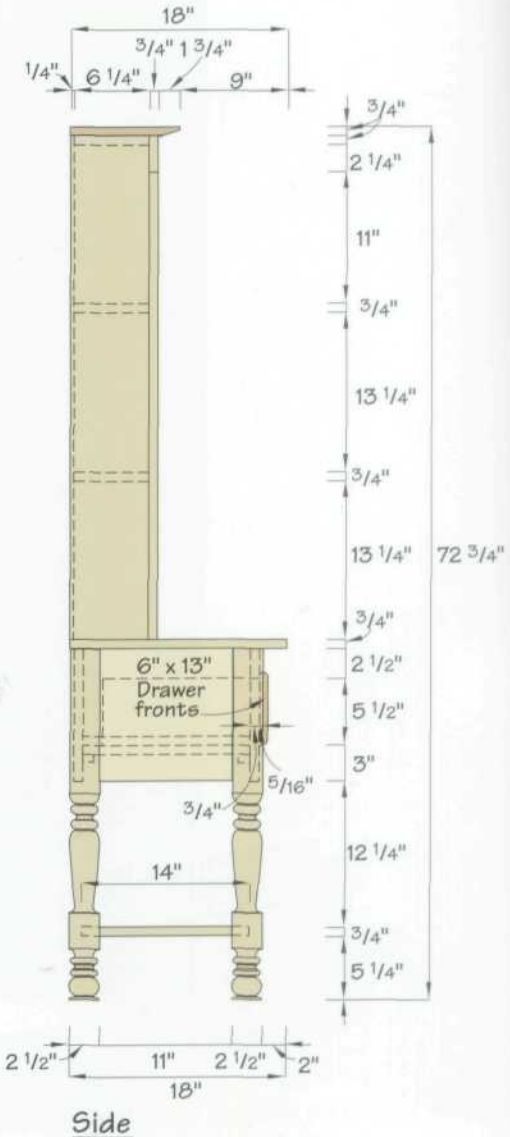


Top



Front



Side

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MATERIALS LIST

Welsh Dresser

No.	*Letter*	*Item*	*Dimensions T W L*
4	A	Legs	2 ½″×2½″×29¼″
1	B	*Front	¾″×2½″×39″
1	C	*Front	¾″×3″×39″
1	D	Front	¾″×5½″×5″
2	E	Fronts	¾″×5½″×4″
1	F	*Lower Back	¾″×11″×39″
2	G	Lower Sides	¾″×11″×13″
1	H	Work Top	¾″×18″×48″
1	I	**Shelf	¾″×14″×40″
4	J	Cleats	¾″×1″×37″
2	K	Cleats	¾″×1″×10¾″
4	L	Drawer Guides	¾″×2″×13⅞″
4	M	Drawer Guides	¾″×1″×13⅞″
2	N	Drawer False Front	¾″×6″×13″
4	O	Drawer Sides	¾″×5⅜″×13″
2	P	Drawer Backs	¾″×4⅞″×10½″
2	Q	Drawer Fronts	¾″×5⅜″×12″
2	R	Drawer Bottoms	¾″×11″×12½″
2	S	Upper Sides	¾″×6½″×42″
2	T	Upper Top	¾″×6½″×41″
3	U	Upper Shelves	¾″×6″×41″
2	V	Plate Strips	½″×¾″×40″
1	W	Trim	¾″×3″×42″
2	X	Trim	¾″×3″×39″
1	Y	Crown	¾″×3″×45½″
2	Z	Crown	¾″×3″×9″
6	AA	Back	½″×7⅛″×41½″

*Includes Tenons
**Cutting allowance included

dealer's store in Atlanta was even bigger, at least ten feel wide. Then again, I've seen small versions not more than 30" wide and 66" fall. The design, and there are two primary versions, takes its name from Wales, a small part of the United Kingdom, where it's supposed to have originated. The earliest versions, made prior to and including the early eighteenth century, were rather crude affairs made primarily by village carpenters. By the turn of the nineteenth century, however, the piece had evolved to the point where it could be regarded as fine furniture, suitable to grace even the finest of drawing rooms. Even so, the basic design remained true to the original traditional form and still does today.

As previously mentioned, there are two basic forms of Welsh dresser: One has a cupboard-bottom and an open-shelf upper dresser; the other, the one we shall be dealing with, is called a "pot-board" Welsh dresser. The original was made in the late 1700s. It has the usual open-shelf upper dresser, but the lower section has two deep drawers side by side and is supported by turned legs connected by a low shelf. This I believe to be the more traditional of the two styles. And, most important, at least to me, it's certainly the more aesthetically appealing of the two designs. It's a challenging piece to build, will take many hours and will involve the use of every tool in the shop. When it's finished you'll have a family heirloom you can be justly proud of; I certainly am of mine.

CONSTRUCTION OUTLINE

Construction is quite straightforward, but there are a couple of tricky areas you should be aware of: the attachment of the lower shelf to the legs and the legs themselves. The legs are made from 2 1/2″ fumiture-grade stock, cut to size, planed smooth and then turned on the lathe to an authentic eighteenth-century pattern. Pine is not the best material for turning, but with time and care you should be able to do a good job. The lower shelf is attached by way of two-way mortises cut into the corners of the legs. To do this I used a combination of dovetail saw and dedicated mortising machine. If you don't have the machine, it would be quite easy to do with a saw and a good sharp chisel.

The upper section is constructed using simple dadoes to attach the shelves to the sides. The back is made from boards of irregular widths, just as was the original. and is fastened to the lower section with removable screws so the piece can be taken down for transportation.

The lower section is constructed using traditional mortise-and-tenon joints to secure the front, back and sides to the legs. The front is made from five separate pieces of stock. The top is made from two pieces of

furniture-grade stock a full 1" thick after planing and sanding. The drawers are constructed using lap joints and cut-steel nails, as were those in the original. You can use dovetails if you desire.

For the finish, I chose painted crackle green over red to match the pie safe described in chapter sixteen. Since then, I've made a second piece and finished it using a dark stain and eight coats of orange shellac followed by a couple of applications of beeswax. Either way, it's a stunning piece.

It will take at least forty hours to construct and finish this traditional Welsh dresser, but the result will please you beyond your expectations.

BUILDING THE DRESSER

STEP 1. Cut all the pieces to size.

STEP 2. Build the boards that will become the shelf and top of the lower section. You can do this using your plate jointer and biscuits or dowels. The dimensions given for the lower shelf are slightly larger than the finished piece. This allows you to cut it to the exact size once the lower section can be dry fitted together.

STEP 3. Using five pieces of stock, build the front of the lower section as laid out in the drawing. Be sure to make the offsets to incorporate the tenons.

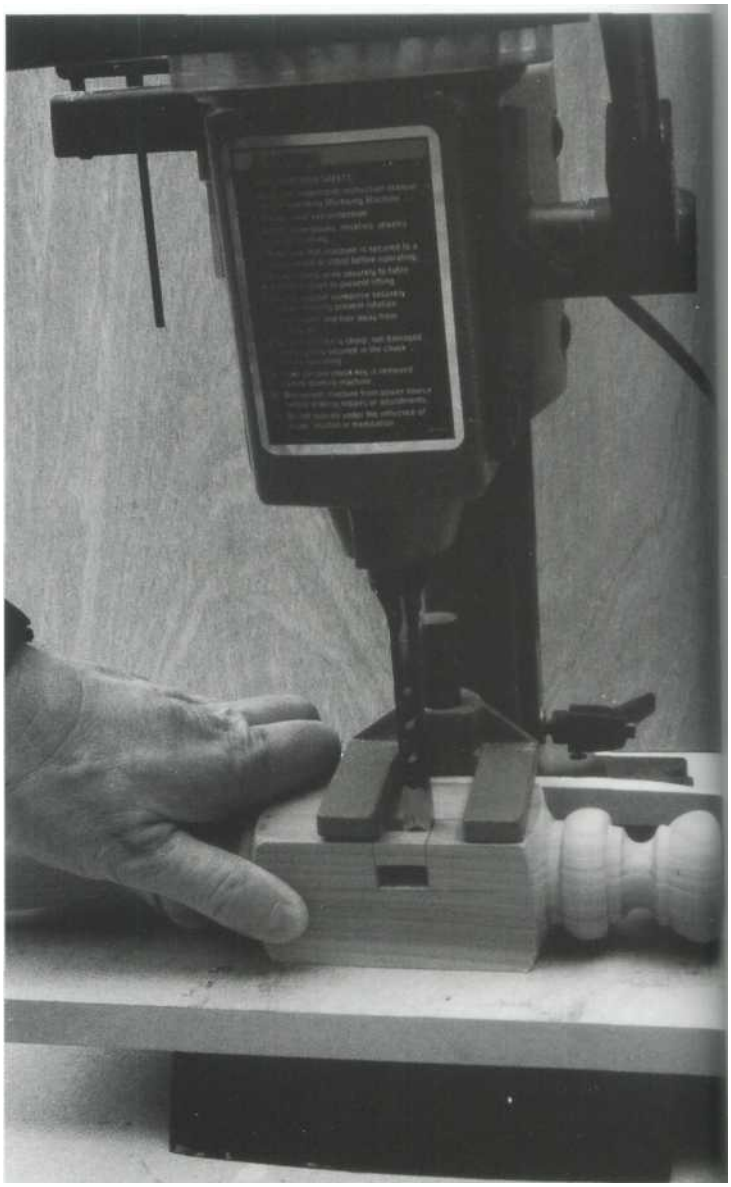
STEP 4. Using the scale pattern, turn the legs. Take care to remove material in very small bites using very sharp tools, and take time to do a good job of the sanding. Even the smallest ring will show dark when you apply the stain. I suggest you do the first finishing steps to the legs before going any further—at least to the sealing and sanding stage—as you'll find in the Shop Tip on **page 75.**

STEP 5. Cut dadoes and rabbets 1/4″ deep to the sides of the upper section as laid out in the drawing.

STEP 6. Glue, clamp and toenail the shelves and top to the sides of the upper section. Check the structure is square, then set it aside to fully cure.

STEP 7. Using either your dedicated mortising machine, mortising attachment in your drill press or hammer and chisel, cut 3/8" mortises, 6" long and 1" deep, into the inner faces of the rear legs to accept the tenons you'll cut to the back and both sides.

STEP 8. Cut two mortises to the front inner faces of the two front legs, 3/8" wide, 2" long and 1" deep, to accept



To make the mortise in the lower section of the legs, you can begin by using either your dedicated mortising machine, mortising attachment for your drill press or those good old hand tools. Mark out the position of the mortise, making sure you have a left and right, and front and back, and then remove the waste, first from one side and then the other.

the tenons of the front section as laid out in the drawing, and a single mortise to each inner side face of each front leg to accept the sides. These should be 3/8" wide, 6" long and 1" deep.

STEP 9. Cut the two-way mortises you see in the drawing and photo above to accept the lower shelf.

STEP 10. Cut the tenons to the back, sides and front of the lower section.

STEP 11. Dry assemble the lower section to ensure a good fit and clamp it to ensure everything is tightly together.

STEP 12. Measure the distance between the backs of the mortises that will accept the lower shelf. Measure from side to side and from back to front. Ensure you do this accurately; the final fit and appearance will depend on how well you do this.

STEP 13. Disassemble the structure.

STEP 14. Cut the lower shelf accurately to size.

STEP 15. Assemble the lower section in the following *specific* order**.**

STEP 16. Using one of the new polyurethane products, glue and clamp the back to the two rear legs and set the result aside until the glue is fully cured, at least twelve hours.

STEP 17. Do the same for the two front legs and the front section.

STEP 18. When the glue is fully cured, remove the clamps from the back and front sections and set the back section on the bench with the mortises that will accept the sides facing up**.**

STEP 19. (Hue the two sides in place.

STEP 20. Apply glue to the two-way mortises that will accept the lower shelf, then set the shelf in place.

STEP 21. Take the front leg section, apply glue to all of the mortises and the tenons of the two sides.

STEP 22. Set the front leg section in place on the tenons and the lower shelf.

STEP 23. Stand the structure on its feet on a flat surface and clamp everything in place.

STEP 24. Check to make sure everything is square and the piece stands squarely on its feet. If you need to make adjustments, do so by adjusting the alignment of the clamps.

STEP 25. When all is satisfactory, set the structure aside for at least twelve hours to ensure the glue cures completely.

STEP 26. Remove the clamps and, using glue and screws, attach the cleats that will secure the top to the inside of the lower section.

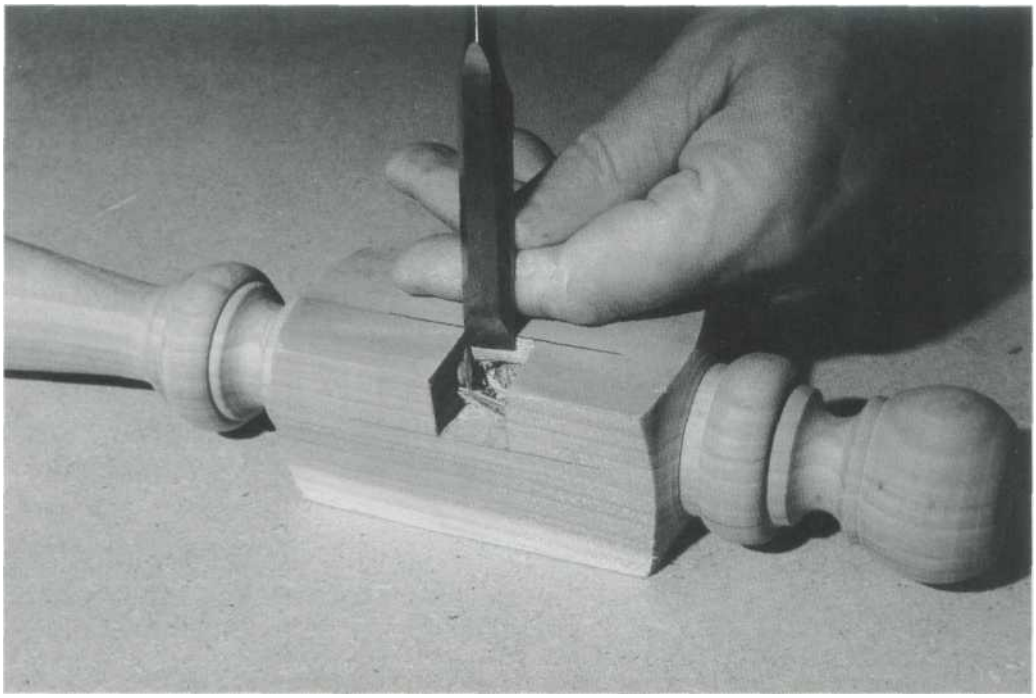
STEP 27. Glue and screw the cleats that will support the drawer guides in place, as laid out in the drawing.

STEP 28. Build the drawer guides and, using glue and screws, fasten them in place on their support. Make sure they are square to the front.

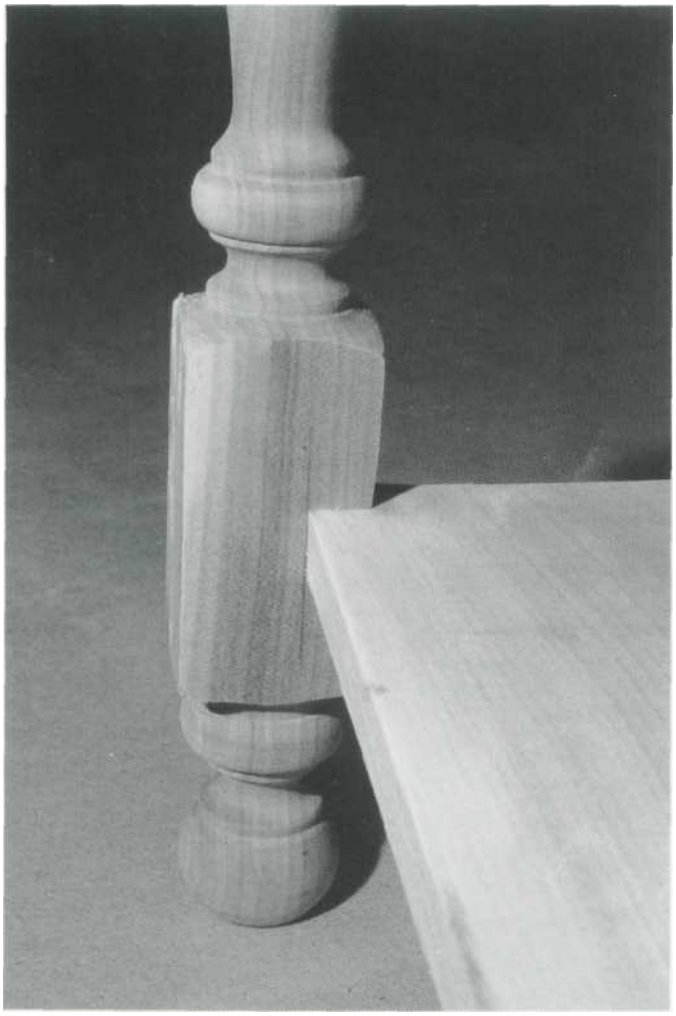
STEP 29. Now, using twelve no. 8 X 1 5/8" screws, five along front and back and one at each end, fasten the top to the cleats. Be sure to elongate the holes slightly to allow room for the top to breathe.

STEP 30. Returning to the upper section, slightly round over the edges of the boards that make up the back.

Now you can use either your table saw or hand saw to remove the small strip that remains.



Clean out the mortise with a chisel, but be careful not to remove too much material or the join! will be sloppy.



Finally, dry fit the shelf to the leg. If all is well, the joint should be nice and tight. When you complete the final assembly, you can use a small amount of glue inside the mortise.

STEP 31. Screw the back boards in place, roundovers facing forward. If you've used odd widths, you can set them in place with widest in the center or in no particular order as I did. The result is pleasing whichever way you do it.

STEP 32. Set your table saw to cut at an angle of 17°. You will use this to mill the bevels to the three pieces that make up the crown.

STEP 33. Mill the bevel to the three pieces that will make up the crown as laid out in the drawing. It's best you do this using a single piece of stock, then cut the three pieces from it when the detail is complete

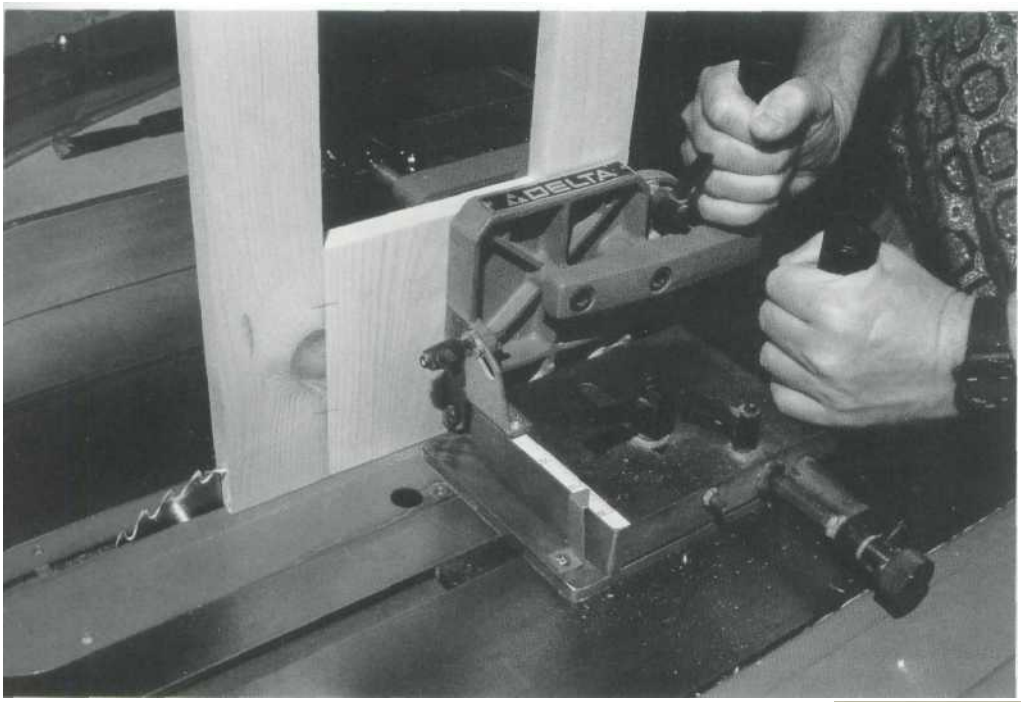
STEP 34. Glue and screw the crown in place on top of the upper section.

STEP 35. Tack and glue the plate-stop strips to the shelves as laid out in the drawing.

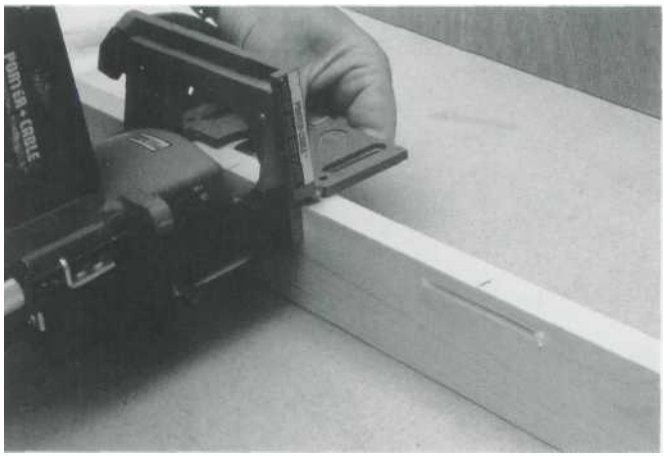
STEP 36. Set the top section in place on the lower section, make sure it stands square, then drill four screw holes through the lower edge of the hack. These will take the screws that will hold the upper and lower sections together. Don't fasten them together yet.

STEP 37. If the upper section is square to the lower section, remove it and set it aside. If not, make any necessary adjustments and try again.

STEP 38. Build the drawers as per the drawing and the Shop Tip



You can use your tenoning to cut the tenons to the ends of the front, as well as the back and sides of the lower case, just as you would with any solid piece of stock.



Attach the trim to the front of the upper case with biscuits and glue. Mark the sides and edge of the trim, and cut the slots in both. Just remember that the mark will always point toward the machine.

SHOP TIP

Sanding and Finishing a Turned Leg or Spindle

Turned legs, once they are assembled to the rest of the piece, can be a real pain to sand smooth, especially if you've used a water-based product that raises the grain. You can make life a lot simpler if you do the following. Once you've sanded the leg smooth, remove it from the lathe and do any necessary staining, sealing, polyurethane coating, etc. When all the coats have dried completely, return the leg to the lathe, set the machine to its slowest speed and start it turning. Then, using either 320- or 400-grit sandpaper, lightly sand the turned sections until they are nice and smooth. Finally, remove the leg from the lathe and apply a final coat of finish.

FINISHING

You have a choice here. As mentioned earlier, I finished the one you see in the color photo to match the pie safe in chapter sixteen. If you decide to do the same, find the technique described there and in chapter three.

If you decide to go with stain and shellac, you'll find that technique described in chapter three. Whichever you choose, lake your time and do a good job, especially where the legs are concerned. The turnings are difficult to do and will lake a lot of care and attention.

CANDLEBOX

MAKING THE CANDLEBOX

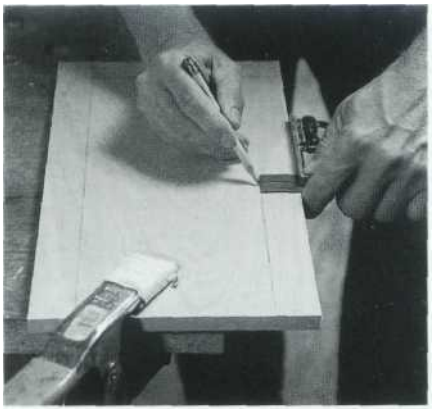
This simple but attractive candlebox is distinguished by its sliding top. The lid has beveled edges tapering so they can slide in grooves cut into the inside faces of the box's sides and one end. A carved, inset pull adds a decorative touch as well as providing a means for easy sliding of the lid.

After the lumber is milled to the required thicknesses, widths and lengths, cut grooves to receive the top and bottom panels. Next, cut the through dovetails at each corner (this procedure is discussed in chapter twenty-five). Bevel the top and bottom panels and assemble the case around the bottom panel, which is left unglued so that it can expand and contract across its width in response to seasonal changes in humidity. Complete construction by fitting plugs into the openings left at each corner at the ends of the grooves.

The open top of the candlebox lid reveals the grooves the lid rides in.

HAND-PLANING THE BEVELS FOR THE CANDLEBOX LID

1 First, make layout lines to mark the limits of the bevel. Make one line around the edges of the lid %" from the lid's bottom surface. Make a second line on the lid's top 1 *'A"* from the outside edges. The bevel will connect these two lines.



2

Plane the bevel across the end grain first so that any tearout occurring at the end of the plane's stroke will be removed when the adjacent bevel is formed. Although a jack plane can be used to make this bevel, it may be necessary to finish with a block plane which, with its lower cutting angle, produces a cleaner surface across end grain.

SHAPING THE PULL

1

With a marking gauge or a sharp knife, make a line parallel to and 1" from the unbeveled end of the lid. Position the stationary leg of a compass on that line halfway across the width of the lid. Draw an arc with the compass's pencil point.

2 Placing the tip of a flat chisel in the scored line, cut along that line, angling toward the arc. Using a wide-sweep gouge, make cuts from the arc back toward the scored line. Carefully lever up chips.

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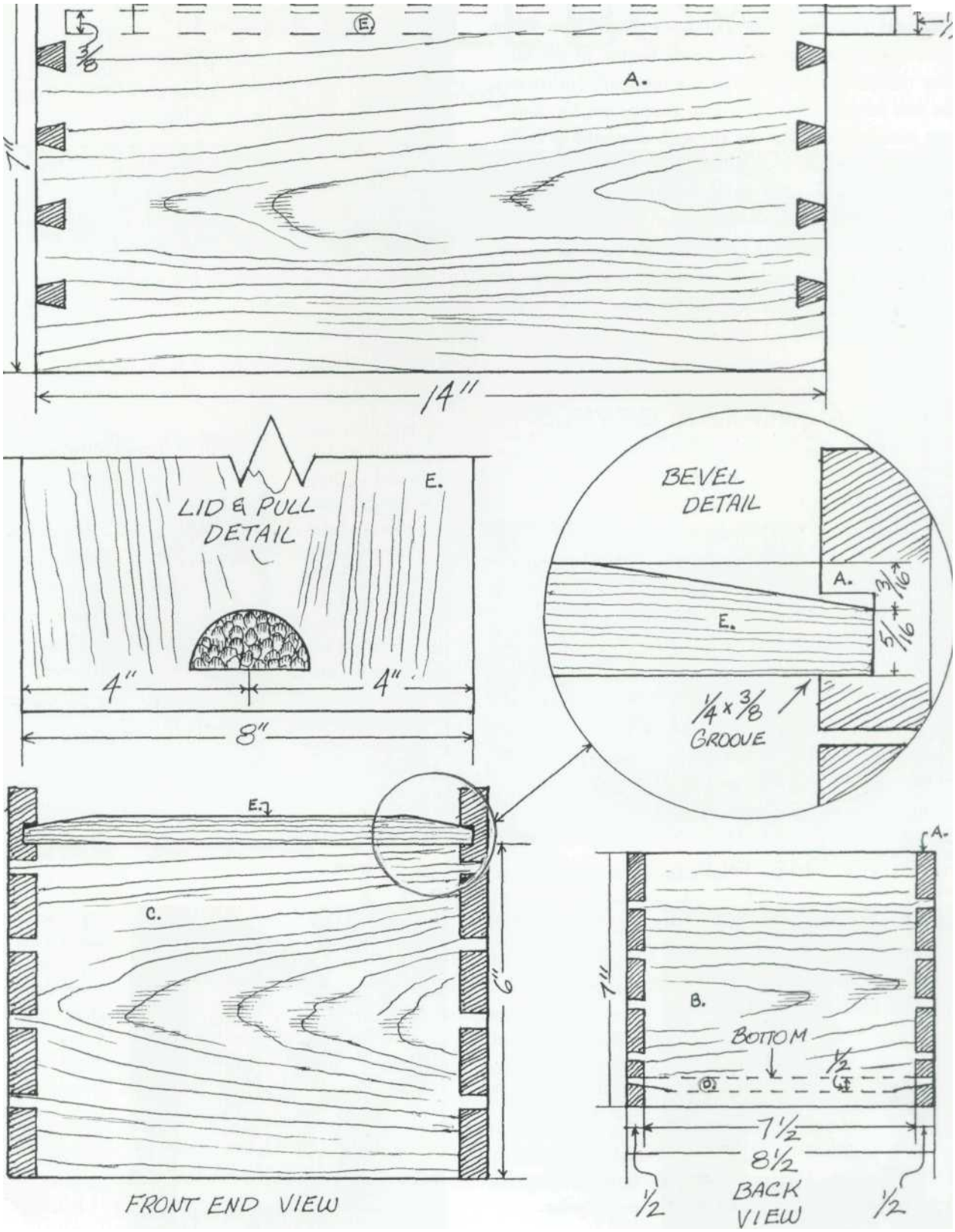
SIDE VIEW


A.
14"
LID & PULL DETAIL
E.
4"
4"
8"
BEVEL DETAIL
A.
E.
3/16
5/16
1/4 x 3/8 GROOVE
E.
C.
9"
FRONT END VIEW
A.
7"
B.
BOTTOM
1/2
7 1/2
8 1/2
BACK VIEW
1/2
1/2

SHAPING THE PULL (CONTINUED)

3 Once the depression has been formed, you can give the pull a smooth surface, or, as I've done here, you can give it a bit of texture.

MATERIALS LIST			
A	Side	*2* pcs.	1/2X7X14
B	End	lpc.	*1/2X7X8 1/2*
C	End	lpc.	1/2X6X8 1/2
D	Bottom	lpc.	*1/2X*8X131/2
E	Top	lpc.	1/2X8X13 3/4
F	Plug	6 pcs.	1/4 X3/8 X1/4, shaved to fit

**These are net measurements, Surplus should be added to dove-tailed parts to allow them to be sanded flush.*

SAM MALOOF'S TWO-STAGE FINISH

Fifteen years ago, ***Fine*** *Woodworking* (issue no. 25) ran a profile of Sam Maloof, the California woodworker best known for his magnificent rocking chairs. Included in the article was a sidebar in which Maloof discussed several technical issues, closing with the recipe for his finishing mix.

My dad—who designed and built several of the pieces displayed in this book, including the crotch-grained chess table—began experimenting with MalooFs finish and found it wonderfully adapted to the small shop. After years of spraying lacquer, a toxic experience inevitably preceded by the emotionally toxic experience of attempting to vacuum every particle of dust from every shop surface, he found in Maloof's formula a finish that not only produced a very appealing surface but also, just as importantly, was impervious to dust contamination.

Preparation is no different for this finish than it would be for any other. Scrape the wood, then sand it with a variety of grits, finishing with a thorough sanding using paper no coarser than 220-grit. Then wipe the wood clean with a tack rag.

Maloof's recipe calls for equal parts mineral spirits, boiled linseed oil, and polyurethane varnish (an extra dollop of varnish seems to add body to the dried film).

Brush on this mixture liberally with only minimal concern for drips and runs—coverage is the focus at this stage. Allow the finish to set until it gets a bit tacky. Depending on temperature and relative humidity, this could be anywhere from ten to sixty minutes.

Wipe the surface with clean rags to remove any excess that has failed to penetrate into the wood.

As the finish dries, it lifts wood fibers and hardens them producing a rough texture. (This first coat acts as a sanding sealer.) Again, depending on temperature and relative humidity, this could take anywhere from one to three days. In humid Ohio, I've found it best to wait three days before sanding that first coat. Otherwise, areas of raised, roughened grain may not make their appearance until after the last coat has dried.

I use 320-grit wet/dry paper soaked in mineral spirits to cut away the raised grain. The thinner clots the removed material into a slurry which may help to smooth the surface; however, my reason for dunking the paper in mineral spirits is to unload the grit in order to get more mileage out of each piece of sandpaper.

Once you have sanded and thoroughly cleaned the surface with a tack rag, apply a second coat of the three-part mixture. It is particularly important that this coat (and any subsequent coats) be wiped clean. Any residue remaining on the surface will dry there and leave a roughened area.

Sam Maloof tops this finish with a layer or two of boiled linseed oil into which he's mixed enough shaved beeswax to achieve the consistency of cream. He applies the wax, allows it to dry, then buffs it out. You can achieve similar effects with a number of commercially prepared waxes.

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BENTWOOD BOXES

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MAKING THE BENTWOOD BOXES

First, make a bending form for the main body of the box. This can be fabricated from any scrap that can be glued together to make up a sufficient thickness. This is then band sawn and sanded to the inside profile of the finished box. Undercut the face of the bending form at one point to allow for the thickness of the lapped material underneath the box's glue joint. Screw a thin strip of metal (I used a scrap of aluminum siding) to the form underneath which an end of the sidewall material should be inserted prior to being wrapped around the form.

At this time, saw a clamping caul (see photos, below) with a slightly greater radius than the bending form from scrap material. This caul will protect the sidewall material from the clamps.

The next consideration is the sidewall material itself. There are three possibilities. First, the stock can be resawn, planed and sanded to a thickness of 1/16". Second, Constant-e's Hardware sells 1/16" veneer in cherry, walnut and mahogany, even though those thicknesses aren't listed in their most recent catalogs. Third, the sidewall material can be glued-up from two thicknesses of 1/32" veneer, which is widely available in a variety of species. I would recommend using one of the new waterproof glues between the laminations, although I have built boxes using regular aliphatic resin glue to bond the thicknesses of veneer.

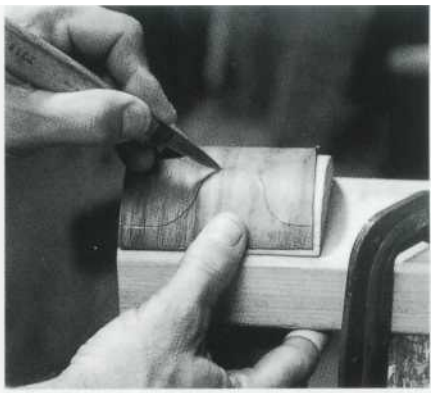
Then, soak the sidewall stock in a tub of cool water for twenty-four hours; dunk it briefly in warm water and take it directly to the bending form. Tuck one end of this softened, plasticized material under the metal strip on the bending form. Wrap the remaining length around the form and secure in place with clamps and the caul.

Four or five days later, remove the sidewall material from the form and cut the profile of the lap joint. A bench extension to which is nailed a piece of scrap sawn to the inside radius of the box simplifies the cutting of the joint.

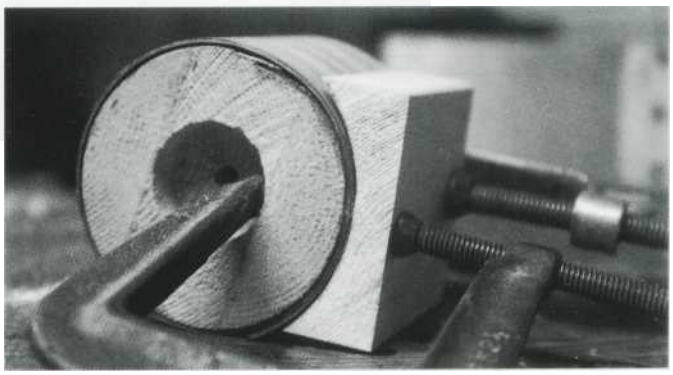
Then, glue the lap, wrap the sidewall material around the form once again and clamp with the aid of the caul. This time, however, do not insert the end of the sidewall material under the form's metal strip. After being turned, attached the box's bottom to the sidewalls with four 1/8″ wooden pegs driven into predrilled holes.

CUTTING THE LAP JOINTS

1 This is the bench extension used to maintain the curved form of the sidewall material during the cutting of the lap. The clamping caul is visible on the right.



2 A lap joint is being cut on the bench extension.



3 Here, the glued lap joint is being clamped with the aid of the caul. Notice that the end of the sidewall material is not positioned under the metal strip as it was during its initial clamping for shape.

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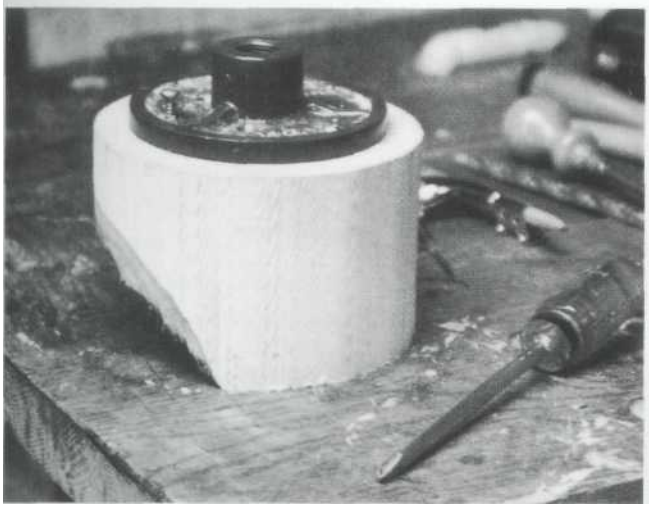
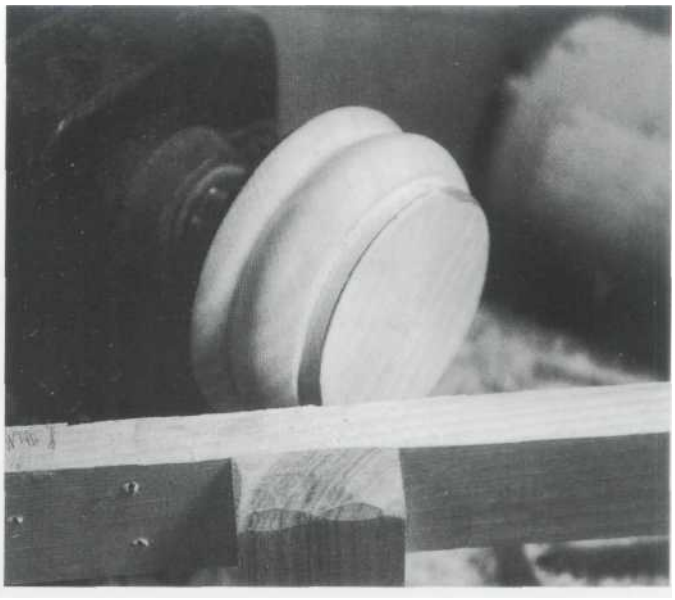
TURNING THE LID AND THE BOTTOM

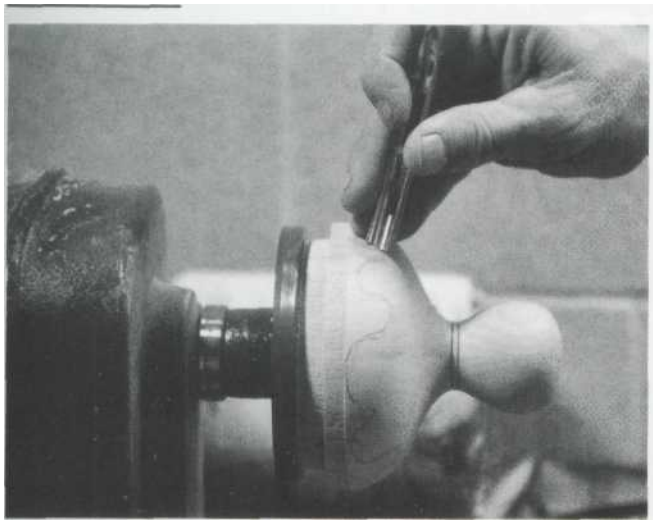


1 Screw a faceplate to a band-sawn turning blank with large sheet metal screws. Then, install it on the lathe.

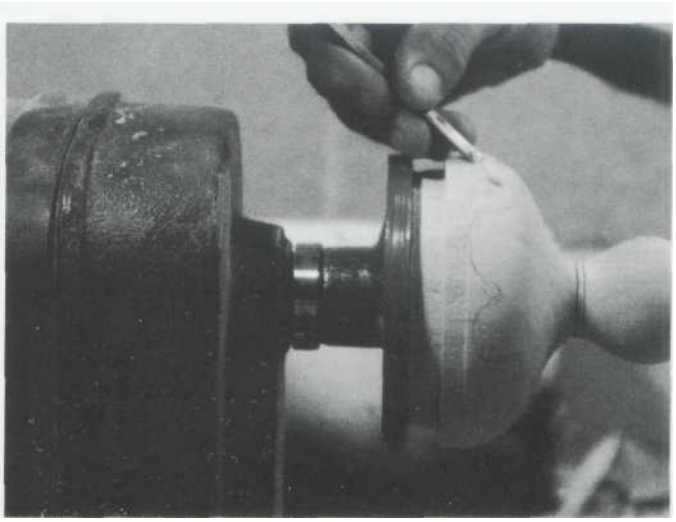


This is the same blank after being turned. Above the bead, notice the flange that will fit inside the box's sidewalls.

DECORATING THE SURFACES



1 Before removing the parts from the lathe, sketch pencil lines on the lid approximating the shapes to be created. Then with gouges of various sweeps, define those lines (shown above).



2 Remove material below the line (as shown above), and create the stippled texture by repeatedly tapping a nail set into the surface of the wood.

MATERIALS LIST		
A Form	1 pc.	3X3/2
B Caul	1 pc.	1/2X3 1/2X3 1/2
C Sidewall	1 pc.	1/16X 3 1/2X15
D Lid	1 pc.	variable
E Bottom	1 pc.	variable
F Pegs	4 pc.	1/8 X 1/8 X 1/2

CHESS TABLE

Walnut, Poplar

MAKING THE CHESS TABLE

This piece is designed around a set of angles taken from the playing pieces, angles echoed in the fat dovetails holding the stretchers to the legs and to each other, in the big triangles cut from the apron parts, and in the compound angles used to bring the legs into the tabletop. The repetition of these angles—in addition to the consistent color of the walnut—unifies this piece.

Construction begins with the two sides (the faces of the table showing the wide sides of the legs). Fasten the apron parts to the legs with wide tenons glued only halfway across their widths in order to minimize the potential for cracking as these cross-grained constructions expand and contract in response to seasonal changes in humidity.

The creation of these joints is complicated by the compound angles at which the legs meet the tabletop. The tenon shoulders on the apron parts, for example, are cut at angles which are 83° from the top edges of these apron parts. The dovetailed ends of the stretcher are simpler to lay out, as these can be marked once the apron tenons have been dry-fit into their leg mortises.

Once dry-fit, glue and clamp these sub-assemblies—each of which consists of two legs, apron part, and stretcher.

On the table saw, give the center stretcher a dovetailed bottom that extends from end to end. Then fit this into dovetail mortises cut into the side stretchers. Surplus length is necessary on this stretcher so that the end grain can be pared back to the 83° angle at which the sides are canted. Then fasten the apron part opposite the drawer front to the legs on the back end of the table with a pair of 1/2"-long tenons. Again, in order to avoid cracking as a result of this cross-grained construction, glue the tenon only across half its width. Screw glue blocks into place behind this joint to reinforce these stubby tenons.

Resaw the drawer guide stock so that one face is canted at an 83° angle. Then, using a set of dado cutters on the table saw, plough a 1/2" X 5/8″ groove down the center of the uncanted face of this stock. Cut the two drawer-guide pieces to length and install them on the inside faces of the apron sides.

The top is the next concern.

If woodworkers stay in the discipline long enough, they inevitably become wood collectors. My dad is no exception. Over the years he's put together a hoard of native hardwoods with an emphasis on black walnut, his personal favorite among American species. At the time this table was built, he had in his collection a number of short lengths of crotch-grained walnut he'd harvested several years before, and he selected four of these for the top of this table because the swirling grain in the walnut echoed the swirling figure in the onyx frame of the chessboard.

Once you have chosen the stock for the chessboard frame, give it a shaped outside edge, and rabbet the bottom inside edge to receive the base on which the chessboard will set. Cut the slots for the splines. You can cut these by hand with a tenon saw, but I find it much easier to perform this operation on the table saw with a Universal Jig. (See

MATERIALS LIST

Table			
A	Leg	4 pcs.	1 × 2¼ × 15¾
B	Apron (sides)	2 pcs.	1 × 5⅜ × 14¼ (includes 1″ tenons on each end)
C	Apron (end)	1 pc.	1 × 5⅜ × 15⅞ (includes ½″ tenons on each end)
D	Stretcher (sides)	2 pcs.	1 × 1½ × 15 (includes dovetailed ends)
E	Stretcher (center)	1 pc.	1 × 2¼ × 18 (includes surplus to be sanded flush)
F	Glue block	2 pcs.	⅞ × ⅞ × 5¼
G	Drawer guide	2 pcs.	⅞ × 3¼ × 13⅞
H	Moulding (sides)	2 pcs.	1 1/16 × 1⅜ × 17¼
I	Moulding (end)	1 pc.	1 1/16 × 1⅜ × 18⅝
J	Chessboard base	1 pc.	¼ × 14⅜ × 14⅜
K	Chessboard frame	4 pcs.	⅞ × 3¾ × 21¼
L	Frame spline	4 pcs.	¼ × 1½ × 5⅜
M	Chessboard	1 pc.	½ × 13⅜ × 13⅜
N	Drawer stop strip	1 pc.	⅜ × 1 × 14⅜
O	Button	4 pcs.	¼ × ¾
P	Screws	various	
Drawer			
Q	Front (apron)	1 pc.	1 × 5⅜ × 14¾
R	Front spline	2 pcs.	¼ × ¾ × 5⅜
S	Moulding	1 pc.	1 1/16 × 1⅜ × 18⅝
T	Front shim	1 pc.	5/16 × 3⅛ × 12 7/16
U	Side	2 pcs.	⅜ × 3⅛ × 13¼
V	Back and front	2 pcs.	⅜ × 3⅛ × 11⅞
W	Bottom	1 pc.	¼ × 12¼ × 12¼
X	Runner	2 pcs.	7/16 × 9/16 × 13¼
Y	Screws	various	

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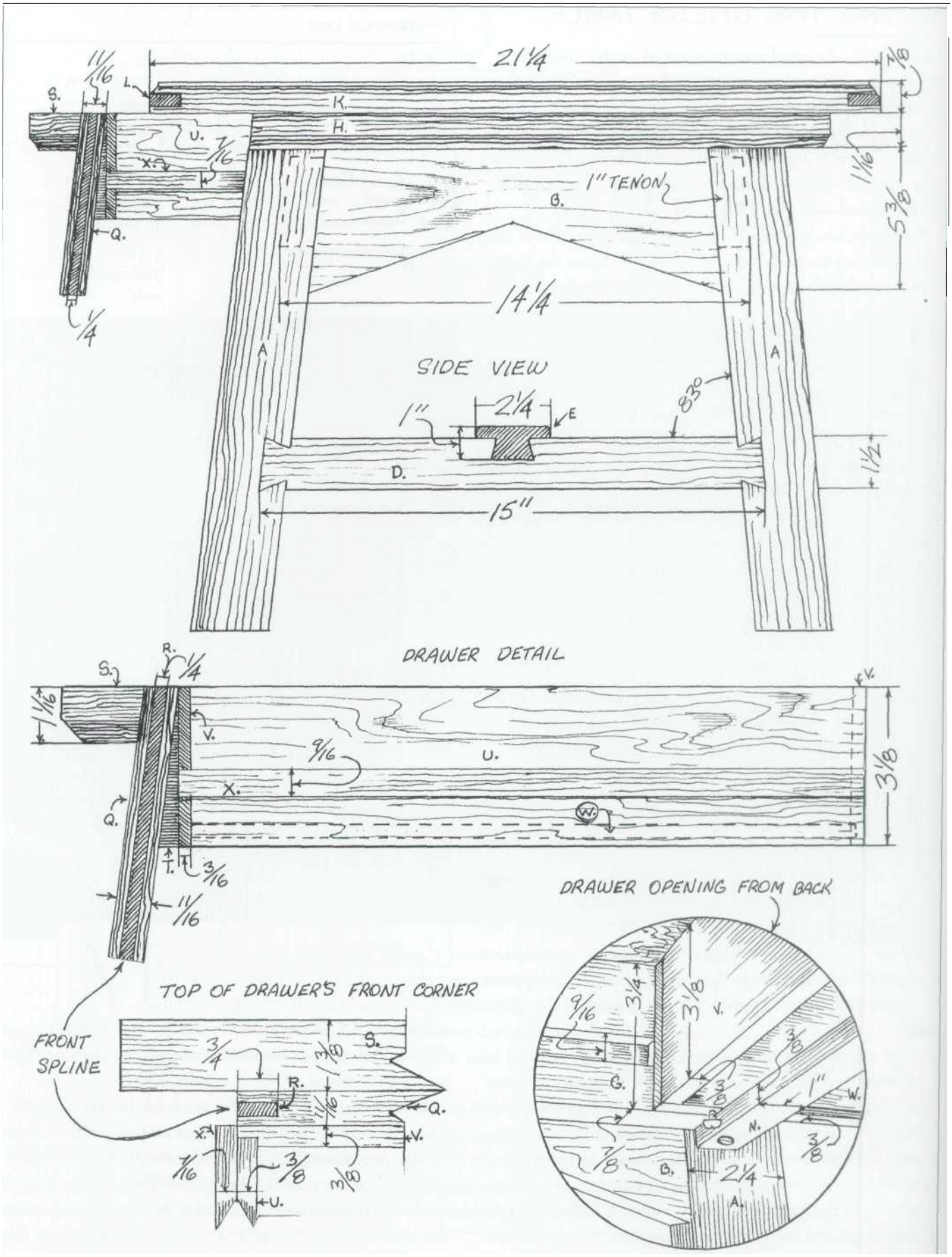

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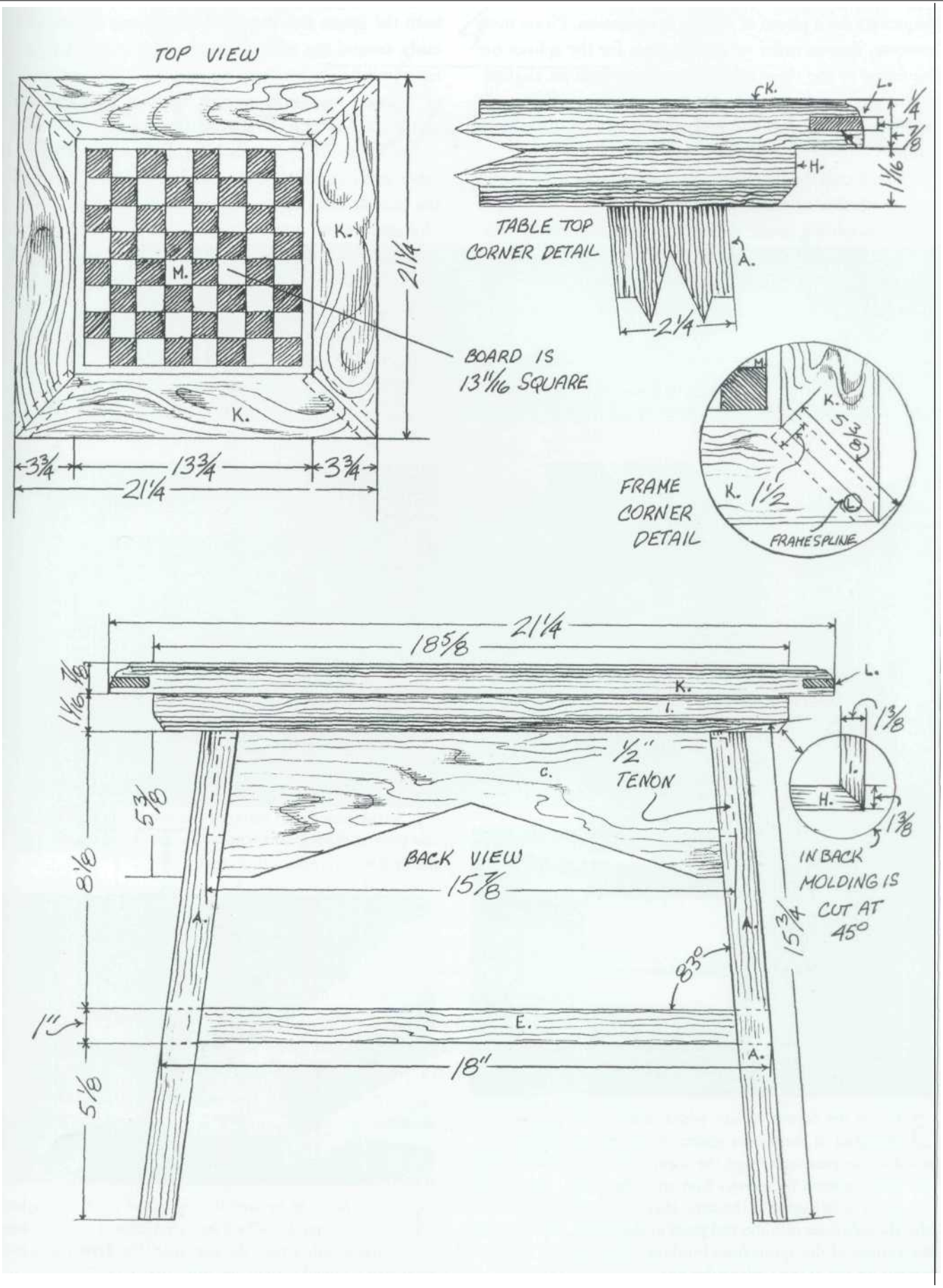

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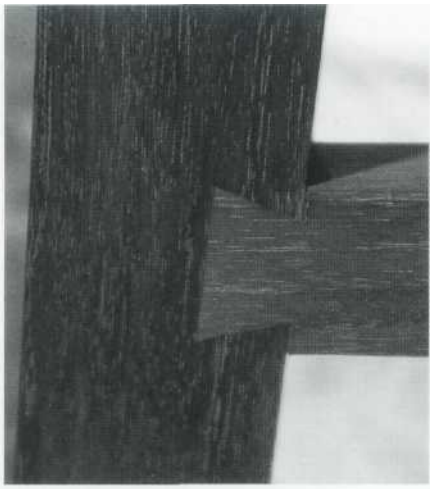
chapter six for a photo of this jig in operation. Please note, however, that in order to cut the slots for the splines on the frame of the chess table, the work would be aligned so that the mitered end of the frame stock sets flat on the saw table). Thickness and cut splines, and assemble the frame.

Next, install the 1/4" chessboard base in its 1/4" X 1/2" rabbet with a number of small wood screws.

The moulding under the tabletop is not merely decorative—it's also functional, serving to fasten the top to the base via a number of wood screws passing up through the moulding into the top and passing through the apron into the moulding.

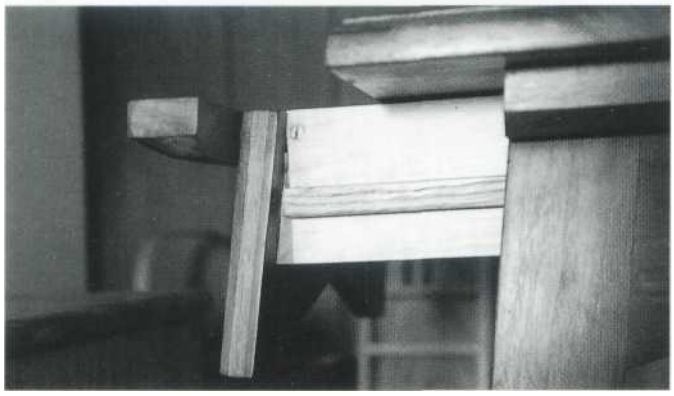
The drawer is a simple open-topped, butt-jointed box, to the front end of which a section of the apron and the moulding are affixed so that when the drawer is closed, both the apron and the moulding appear to run continuously around the table. Place a wedge of wood the full length of the drawer front, tapered from a bottom thickness of 5/16" to a top thickness of 0 between the drawer front and the apron that covers the drawer front. This shim causes the apron to be canted at the same 83° angle as the other sections of the apron. Slide the runners screwed to the outside faces of the drawer sides into the grooves ploughed in the drawer guides. Construct a drawer stop by screwing a strip of wood across the bottom of the drawer guides. When the drawer is opened to its greatest extension, a pair of screws turned slightly into the bottom edge of the drawer sides strike this strip, preventing the drawer from coming out too far and spilling its contents.

After finishing the table, set the chessboard into place on a felt pad.

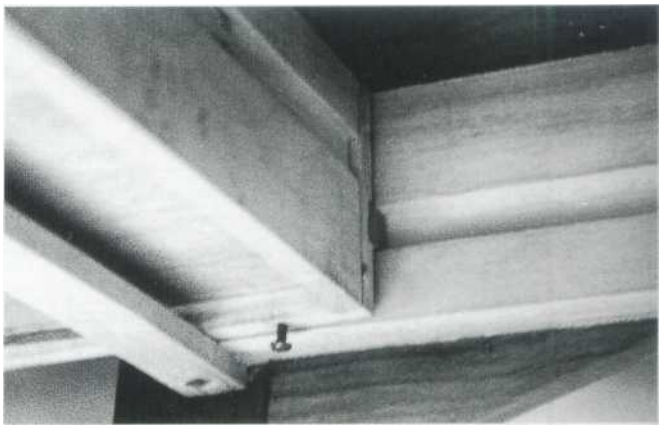


1 Fasten the stretcher to the leg with a hand-cut dovetail

2 Screws passing up through this moulding into the top and passing through the apron into the moulding hold the top to the base.



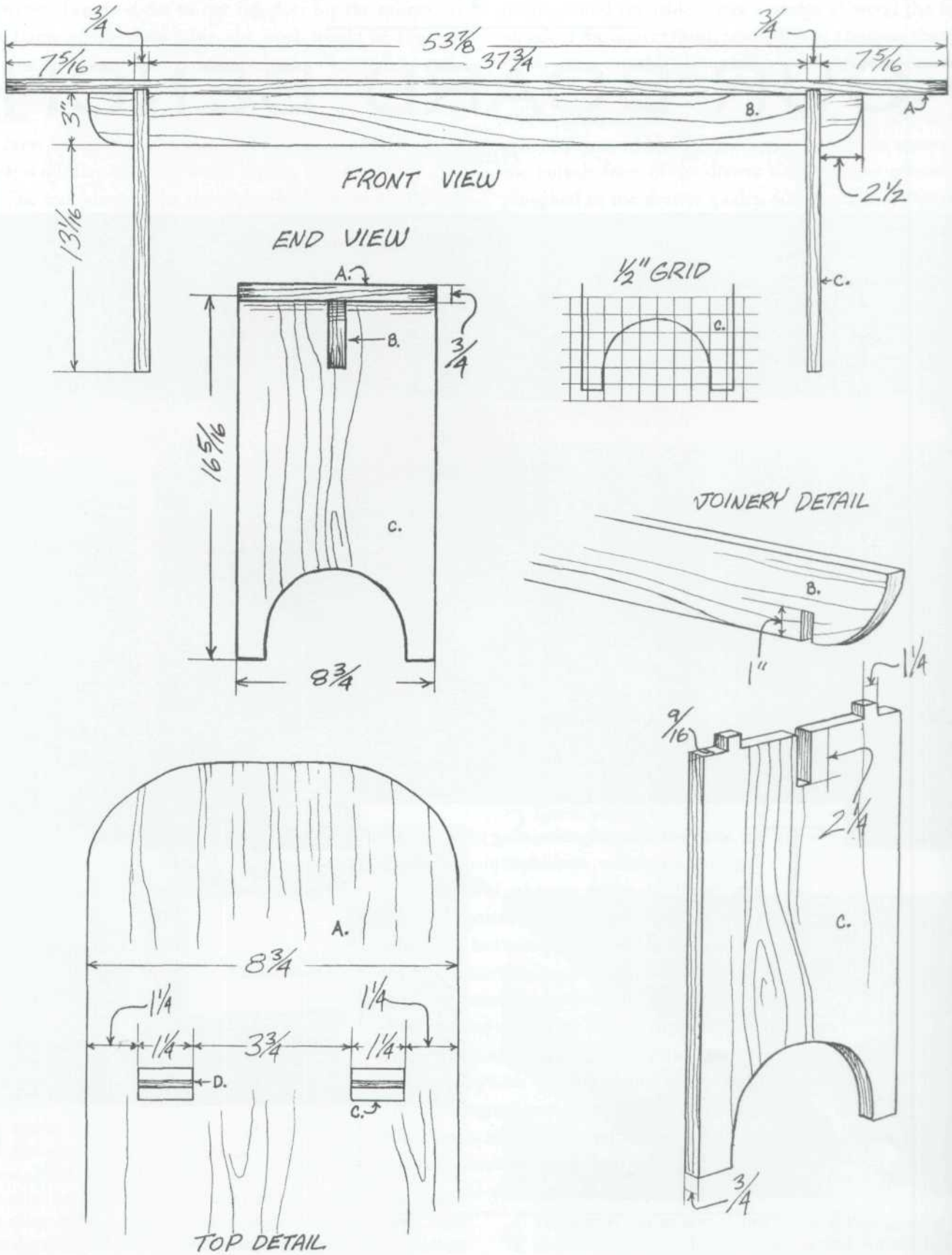
3 Fasten the drawer runner, which slides in the groove ploughed in the drawer guides, to the drawer via several wood screws passing through the drawer side into the slide. Note the shim between the drawer front and the apron. This causes the apron to be canted at the same angle as the table's legs. Note also the spline set into the end grain of the apron. This prevents the corners of the apron from breaking off because of the grain runout on the apron's triangular tips.



4 The drawer can be seen sliding in the groove ploughed in the drawer guide. When the screw turned into the bottom of the drawer side strikes the stop strip, the drawer is prevented from being pulled completely from the table.

FOUR-BOARD BENCH

Hickory



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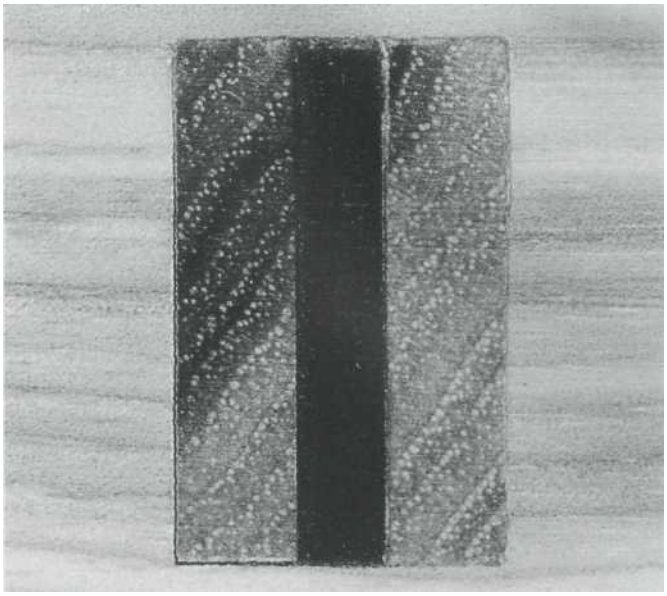
MAKING THE FOUR-BOARD BENCH



After the material has been dimensioned, profile the rounded ends of the top, the half round ends on the stretcher, and the circle cutouts on the legs. This can be done on the band saw, but because of the length of the top, it is probably easier to cut this, at least, with a handheld jigsaw.

Next, using a cutoff box on the table saw (or crowded against the fence of the radial arm saw), form the dadoes on the underside of the top. Cut the through mortises cut using the method described in chapter twelve.

Then, on the band saw, cut the through tenons at the tops of the legs. Because of the 1/4"-deep dado, these need only be 9/16" long (1/2" for the tenon and 1/16" to be sanded flush). Then, fit them into their mortises.

Next, cut the edge cross lap joints that will fasten the stretcher to the legs. Two notches are required at each leg. Cut one, 2 1/4" deep, in the leg panel midway between the through tenons. Cut the other, 1" deep, into the bottom edge of the stretcher. The extra 1/4″ in the total depth of the two notches is necessary because of the 1/4" dado on the underside of the bench top.

Then cut the notches in the ends of the through tenons using a fine-toothed backsaw. Drill a 1/8" hole from end to end at the base of each notch. This will prevent the tenon from splitting when the wedge is driven into the notch.

After the parts have been dry-fit, glue the joints and assemble the bench.

MATERIALS LIST

A	Top	1 pc.	¾ × 8¾ × 53⅞
B	Stretcher	1 pc.	¾ × 3 × 44¼
C	Leg	2 pcs.	¾ × 8¾ × 16⁵⁄₁₆
D	Wedge	4 pcs.	⅜₁₆ × 1⅛ × ¾

**These are net measurements. A surplus should be added to lengths of through tenons so that they can be sanded flush.*

TV Riser

Cherry

MAKING THE TV RISER

First, the material that will make up the riser is glued together.

Then, dress down the glued-up panel to a flat surface and a consistent thickness. In a shop with a big planer, this involves nothing more than feeding the stock into the machine; but in a small shop, like mine, this 15" panel must be flattened and smoothed with hand planes.

If the boards used to create the panel were all flat and all aligned correctly at glue-up, you may not need to do more than scrape away the glue squeeze-out and make a couple of token passes with a jack plane. However, boards are rarely flat, often undulating along their lengths like bacon. In such cases, more substantial plane work may be needed.

I begin by exchanging the regular iron in my jack plane for one that's been crowned across its width. This shape eliminates the sharp corners on either side of the iron's width, corners that can dig too deeply into the planed surface when the craftsman is attempting to remove material quickly. With this crowned iron, it's relatively easy to remove significant amounts of thickness. It does, however, leave a rippled, rather than smooth, surface, so it must be followed by a plane fit with a conventional iron.

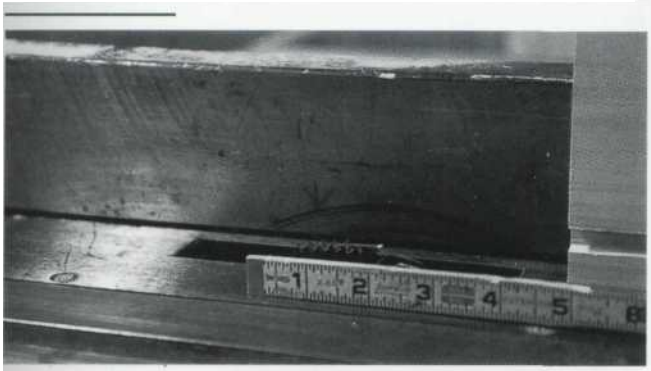
Next, cut the grooves into which the scrollwork will be inset. You can cut the groove across the bottom face of the top panel in one pass over a table saw fit with a 3/8" stack of dado cutters. But the grooves in the two end panels must be handled differently. Because the scrollwork is only two inches high, stopped grooves are necessary.

You can cut these freehand with a mallet and chisel or start them on the table saw and finish them by hand.

The scroll is then thicknessed, ripped to width, and profiled on the band saw.

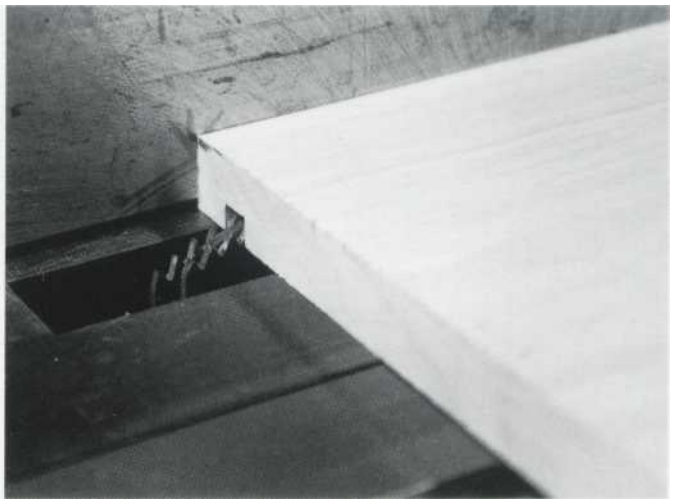
Following the procedure discussed in chapter twenty-five, cut the through dovetails joining the end and top panels. Then, glue-up the riser around the strip of scrollwork, and plug the holes in the ends of the grooves.

CUTTING A STOPPED GROOVE ON THE TABLE SAW

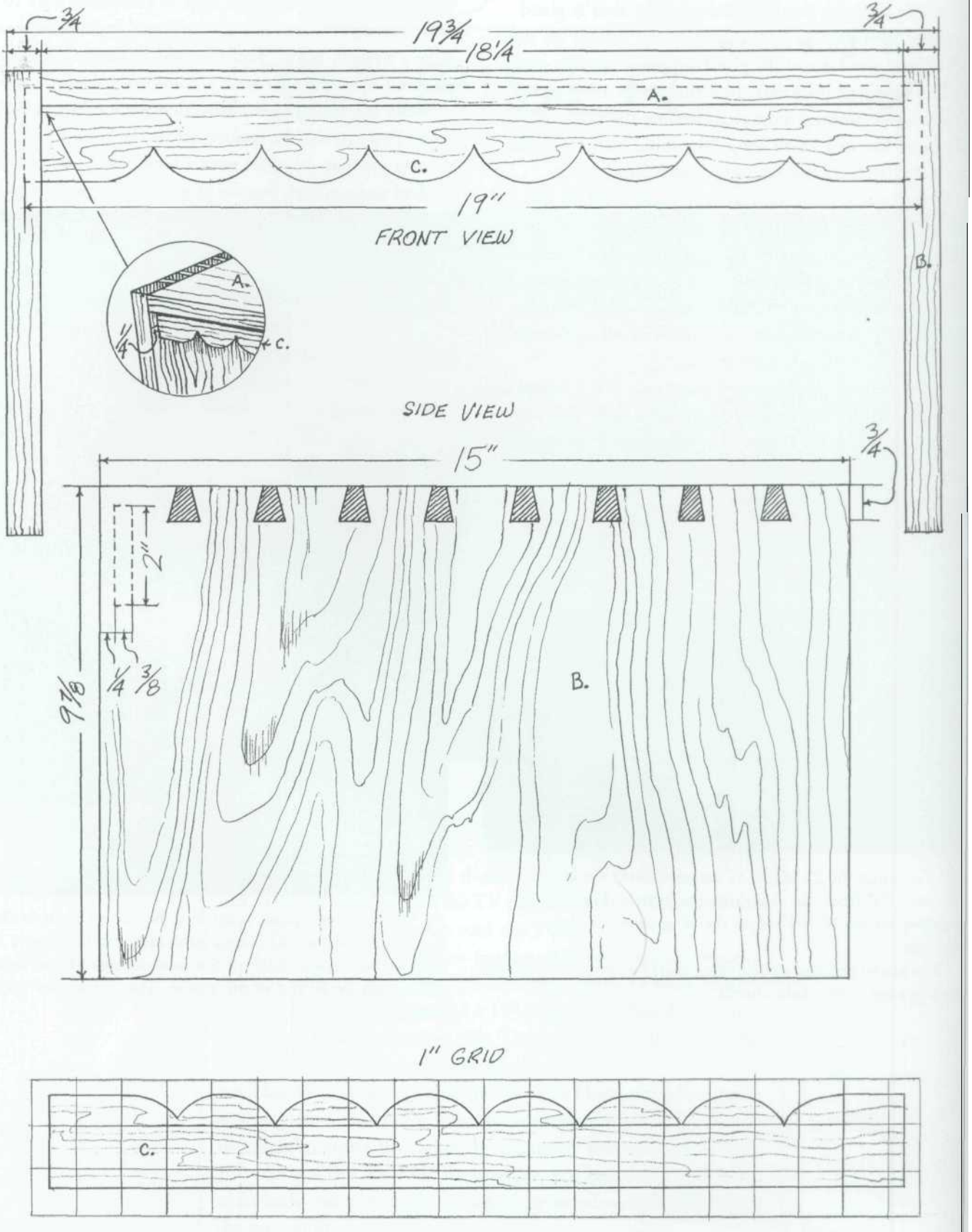


1 To match the 2" height of the scrollwork, the groove must stop 2 3/8" from the top of the end panels. The extra 3/8" provides for the 3/4" top minus the 3/8" groove cut into that top.

The arrow penciled on the fence marks a point 2 3/8" past the leading edge of the dado cutters.



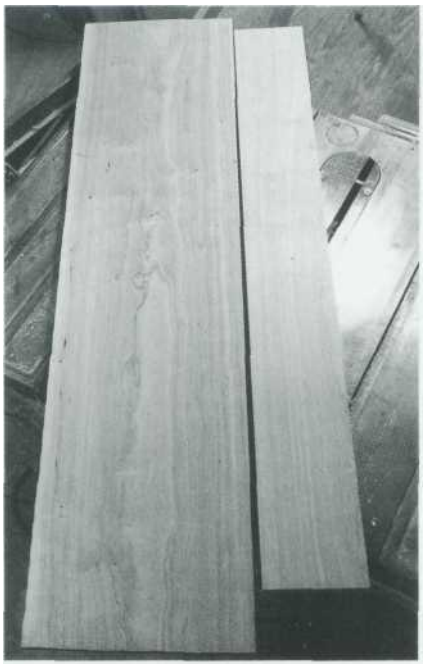
2 When the end panel is fed into the cutters as far as the penciled arrow, the cutters have advanced the groove *2 3/8"*. (Due to the circular shape of the dado cutters, a bit of material will remain in the end of the groove. This is removed with a chisel.)


3/4
19 3/4
18 1/4
3/4
A.
C.
19"
FRONT VIEW
B.
A.
1/4
C.
SIDE VIEW
15"
3/4
2"
9 1/8
1/4
3/8
B.
1" GRID
C.

GLUING-UP PANELS

1 Matching figure and color is the first step. Here, two walnut boards with sapwood edges are being matched.

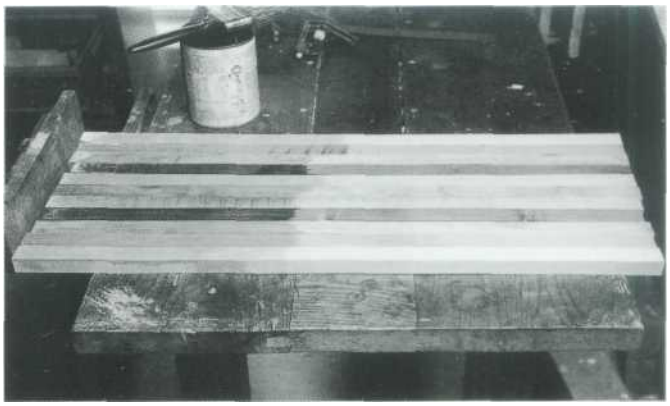
2 These two pieces of cherry were both cut from the same board, assuring a consistent color. Also, making the joint at the edges of the board where the lines of figure cluster close together helps to produce an invisible glue line.



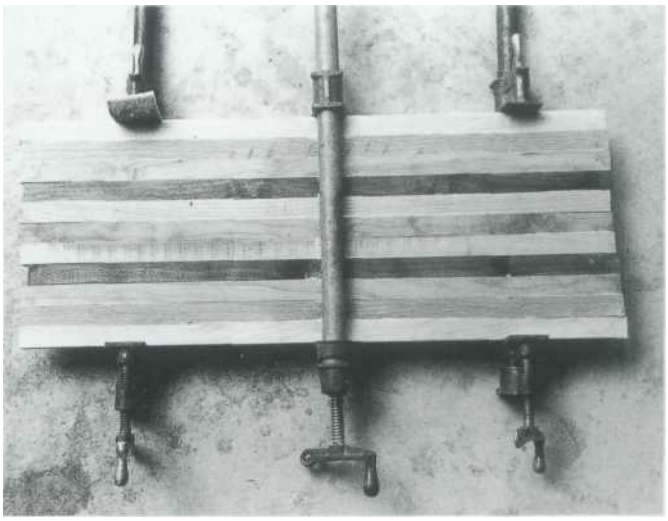
MATERIALS LIST

A	Top	1 pc.	¾ × 15 × 19¾
B	End	2 pcs.	¾ × 15 × 9⅞
C	Scroll	1 pc.	⅜ × 2 × 19
D	Plug	2 pcs.	⅜ × ⅜ × ⅜, shaved to fit

**These are net measurements. Surplus length should be added to all dovetailed parts to allow them to be sanded flush.*



3 A wash of mineral spirits reveals color, enabling you to achieve better matches.



4 Once you have matched (or, as in this case, contrasted) color and grain, form glue joints (the lowly butt joints) on the edges of each board. These joints consist of nothing more than flat, straight planes 90° from the board's adjacent surfaces.

You can create the joint by hand, using a jack or jointing plane. However, this is fussy work requiring experience and a steady hand. You can also create the joint on the jointer, a stationary power tool designed to perform this very task.

After cutting the joints, coat each edge with glue and align them in pipe or bar clamps. These are necessary in order to bring the joints tightly together.

Clamp arrangement should follow the pattern shown above. Position them no more than 12"-15" apart on alternate sides of the panel. After a couple of hours, you can remove them; within eight hours, you can work the panel.

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SHAKER-STYLE MIRROR

Walnut, Curly Maple

MAKING THE SHAKER-STYLE MIRROR

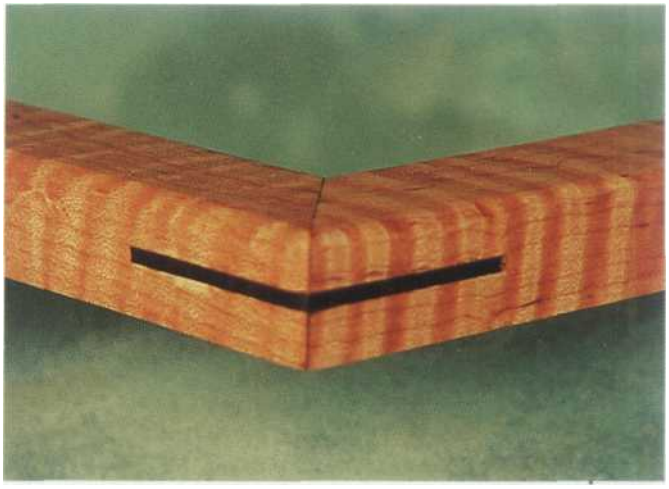
Begin construction with the mirror itself. After thicknessing the frame stock, cut the 1/2″ X 3/8" rabbet on what will become the back, inside edge of the frame. (This rabbet will ultimately receive the glass and the glass backing.) Form a radius on the two front edges of the frame stock.

Then miter the frame parts. You can do this on a miter box or a table saw or radial arm saw using a very fine-toothed blade. At this point, cut the slots for the feathers that will later join the frame parts. You can cut these by hand with a tenon saw or on a table saw fit with a hollow-ground planer blade, using a Universal Jig to control the stock as it is passed over the blade. Precision is important in the cutting of both the miters and the feather slots as these joints comprise the entire inventory of joinery in the mirror frame. Any error in these processes is very difficult to hide.

The feather stock is then thicknessed and slid into the slots, marked, and cut. The frame is assembled with glue.

The hanger consists of only three parts: the blade, the shelf and the shelf front.

Fashion the blade first. After cutting its shape on the band saw, facet the top edges. Do this by hand, guided by a marking system similar to that used in the hand manufacture of the raised panel in chapter one. First, draw a line down the center of each edge to be faceted. Then draw lines on the front and back faces of the blade adjacent to these edges. These lines should be placed about 3/16″ from the corners. Then, by using a wood file to create planes, join the lines down the center of the edges and the lines on the blade's faces. You could create these planes freehand, but the reference lines make it much easier to produce regular shapes.

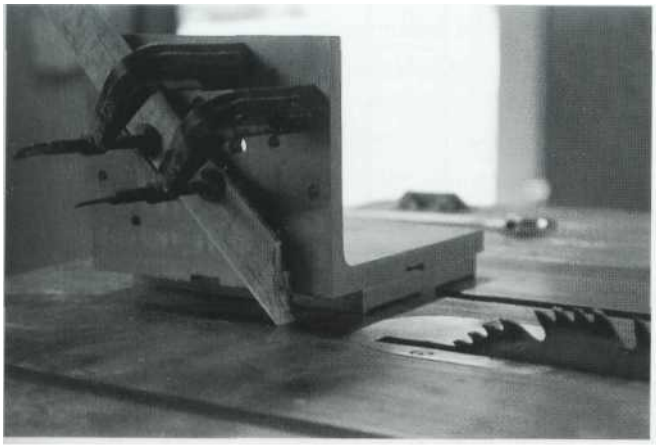


The walnut wedges in the mirror frame corners are not only beautiful, they also add structural support.

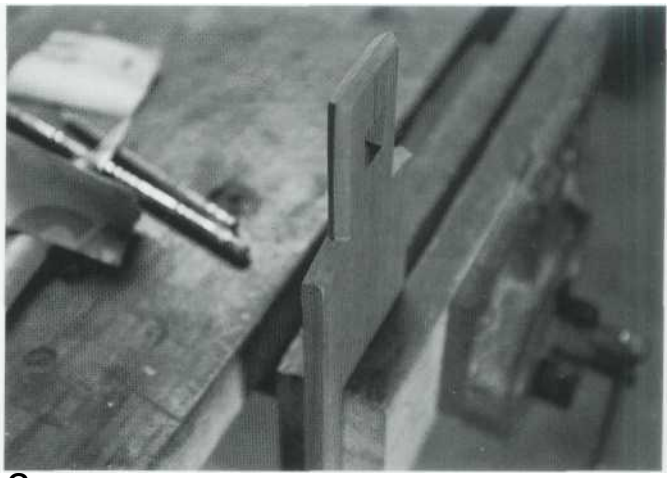
Cut a dado on the back edge of the shelf, and position the blade in that dado, holding it there with a bit of glue and two 1 1/2″ no. 12 wood screws.

Then profile the shelf front on the band saw and facet all except the top edges in the same manner as that used for the top edges of the blade. Glue this to the front edge of the shelf.

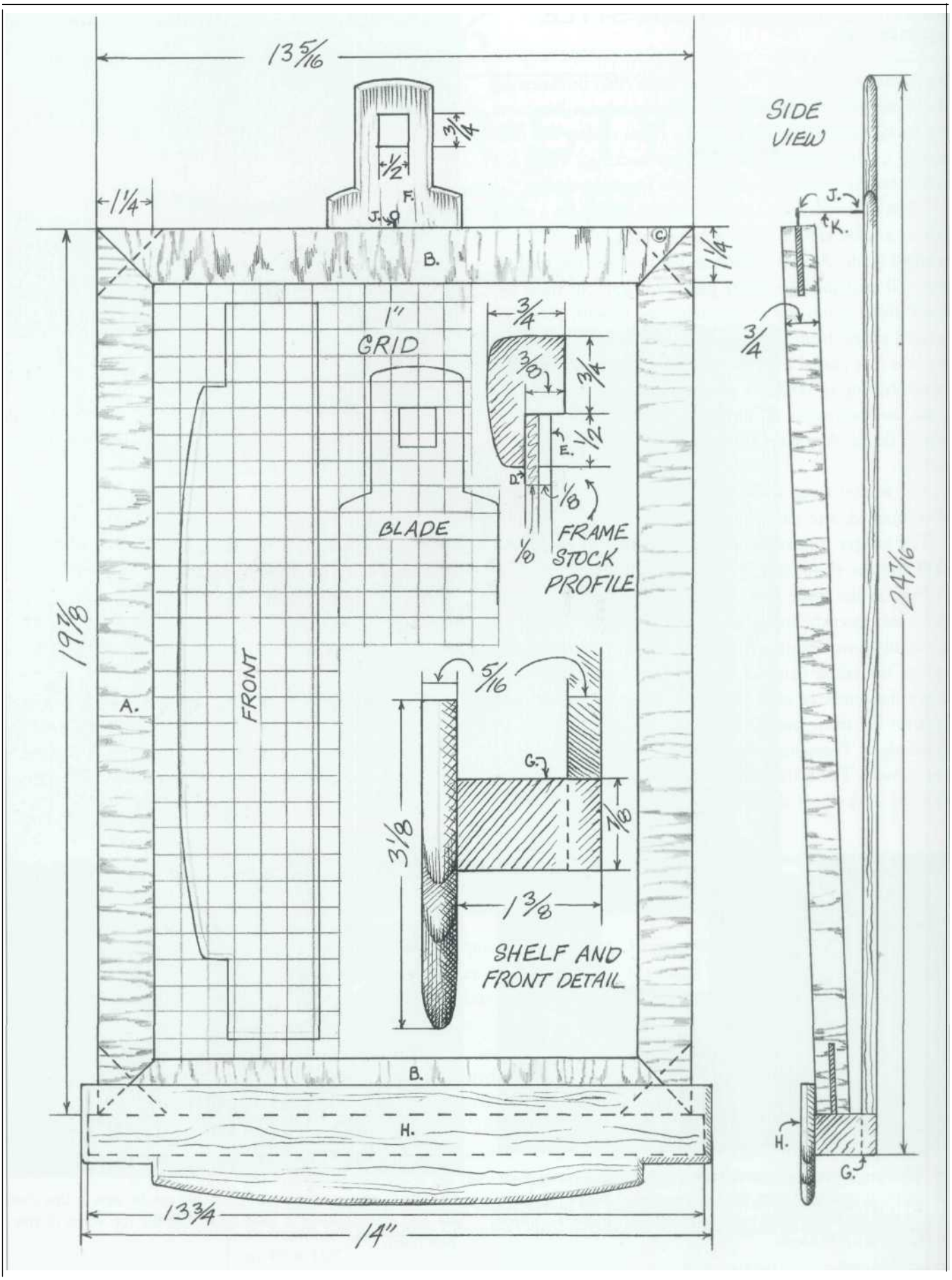
After sanding and finishing the wood parts, place the mirror glass and a matt board backing inside the rabbet cut in the back side of the mirror frame. Hold both in place with the protruding heads of a half-dozen wood screws turned into the sides of the frame rabbet.



1 Clamp a piece of mitered frame stock in the Universal Jig prior to passing it over the hollow-ground planer blade. Notice that the frame stock rests on its mitered tip and is clamped in the jig at a 45° angle.



2 The faceting at the top of the blade can be seen in this shot. The same faceting is used on all but the top edges of the shelf front.



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ADHESIVES

A recent *Woodworker's Supply* catalog lists eleven different types of adhesives. Several of those—for example, hot melt glues—are available in different formulas for different applications. These different formulas increase the actual number of choices to sixteen.

Sixteen kinds of glue?

Without devoting significant time to study and experimentation, no woodworker is likely to make the perfect adhesive choice for any particular application. And who wants to spend hours studying adhesives?

In my shop, except for specialized applications (for example bonding Formica-like products to wood), I've reduced the adhesive inventory to three choices: white glue (plain old Elmer's), yellow glue, and hide glue, all of which are more or less appropriate for any wood-to-wood joint.

Each of these three types forms a bond that is stronger than necessary for wood furniture. The primary differences are the amount of working time they allow, the ease with which joints they've bonded can be disassembled, and the convenience of their application.

Hide glue allows for relatively easy disassembly when making repairs and also offers the woodworker the longest working time. It's available in two forms, each of which, unfortunately, has its own set of drawbacks. Traditional hide glue, which comes in flakes or pearls, must be mixed with water and kept heated to a temperature of 140-150° F. Then, after a few days, it must be thrown out and a new batch mixed because, once mixed and heated, it quickly loses its strength. All of this is a significant inconvenience for the owner of a small shop.

The other form comes premixed in squeeze bottles just like white and yellow glues. Unfortunately, however, its shelf life is shorter than white or yellow glue and much shorter than the dry form of hide glue.

In terms of convenience, both white and yellow glue are clearly superior to hide glue. They come premixed in easy-to-use squeeze bottles. They have long shelf life if kept from freezing, and they form an all-but-unbreakable bond between two pieces of joined wood.

There are, however, drawbacks to their use. First, because the bond they form is all-but-unbreakable, a piece assembled with these glues is very difficult to repair. If a yellow- or white-glue-assembled chair comes into my shop needing a new rung, I have to explain to the customer that I can't predict the cost of the repair.

MATERIALS LIST

Mirror		
A Sides	2 pcs.	¾ × 1¼ × 19⅞
B Top and bottom	2 pcs.	¾ × 1¼ × 13⅝
C Feather	4 pcs.	3/32 × 1⅛ × 2⅛
D Mirror glass	1 pc.	⅛ × 11 11/16 × 18¼
E Mirror backing	1 pc.	⅛ × 11 11/16 × 18¼
Rack		
F Blade	1 pc.	5/16 × 3 × 24 7/16
G Shelf	1 pc.	⅞ × 1⅜ × 13¾
H Front	1 pc.	5/16 × 3⅜ × 14
Hardware		
I Brass eye hook	2 pcs.	⅞
J Brass chain		
K Screws	various	

Whereas a chair assembled with hide glue can be disassembled by applying warm water to a tight joint, thus allowing a fairly predictable repair time, the same chair assembled with white or yellow glue may resist my best efforts at disassembly. On more than one occasion, I've broken the slab seat on an old Windsor trying to break loose parts that have been joined with white or yellow glue.

The second problem associated with the use of white and yellow glues is short assembly time. When using these products, a woodworker may have only ten or fifteen minutes to get parts aligned and clamped before the glue grabs and adjustments become all but impossible to make. The time constraints applied to the assembly process by white and yellow glues add stress to an already stressful procedure.

In my shop, I follow these guidelines when choosing an adhesive:

1. For large, complex pieces with a high dollar value (pieces for which one could justify the cost of making repairs), I use hide glue.

2. For pieces requiring lengthy assembly time, I use hide glue.

3. For all other applications, I turn to the ease and convenience of white and yellow glues. For example, all the pieces in this book were assembled with one of those two varieties, the choice being determined by the prox imity of the glue bottle to my hand when it was time to glue something up.

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SIDE TABLE WITH MAPLE DRAWER

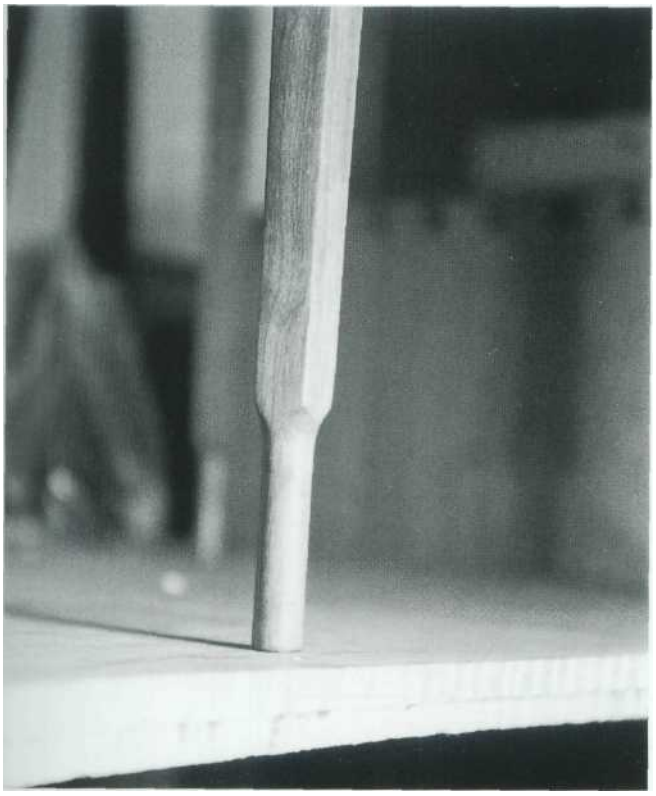
Cherry, Curly Maple

MAKING THE SIDE TABLE WITH CURLY MAPLE DRAWER

Joint, glue and clamp the boards selected for the top and set aside. Next, fashion the legs.

Rip and joint the leg stock to 1" X 1", and draw the tapers on the front and side of each leg. At the base of the apron, these two faces measure the full 1" X 1". At the floor, the legs measure $^{9}/16$"X $^{9}/16$". Then cut the tapers on the band saw, keeping the blade well to the waste sides of the taper lines. Finish the taper with a hand plane, while holding the stock in a vise.

Next, center the leg stock so that it can be loaded into the lathe prior to turning the feet. On the narrow end of each leg, this is simply a matter of drawing diagonals across the end grain. On the other end of the leg, however, finding the center is a bit more complicated because you don't want the actual center of the 1"X 1" end grain square. What you do want is the center of the 9/16" X 9/16" end grain square directly in line with the square on the opposite end of the leg. To find this, draw a square measuring 9/16" X 9/16" on the end grain with two sides of that square directly on top of what will become the outside edges of that leg. Draw diagonals on this square to find the center.



The table's dainty turned foot is blended into the flat, tapered sides.

The thin contrasting band inlay adds the perfect touch to this tabletop.

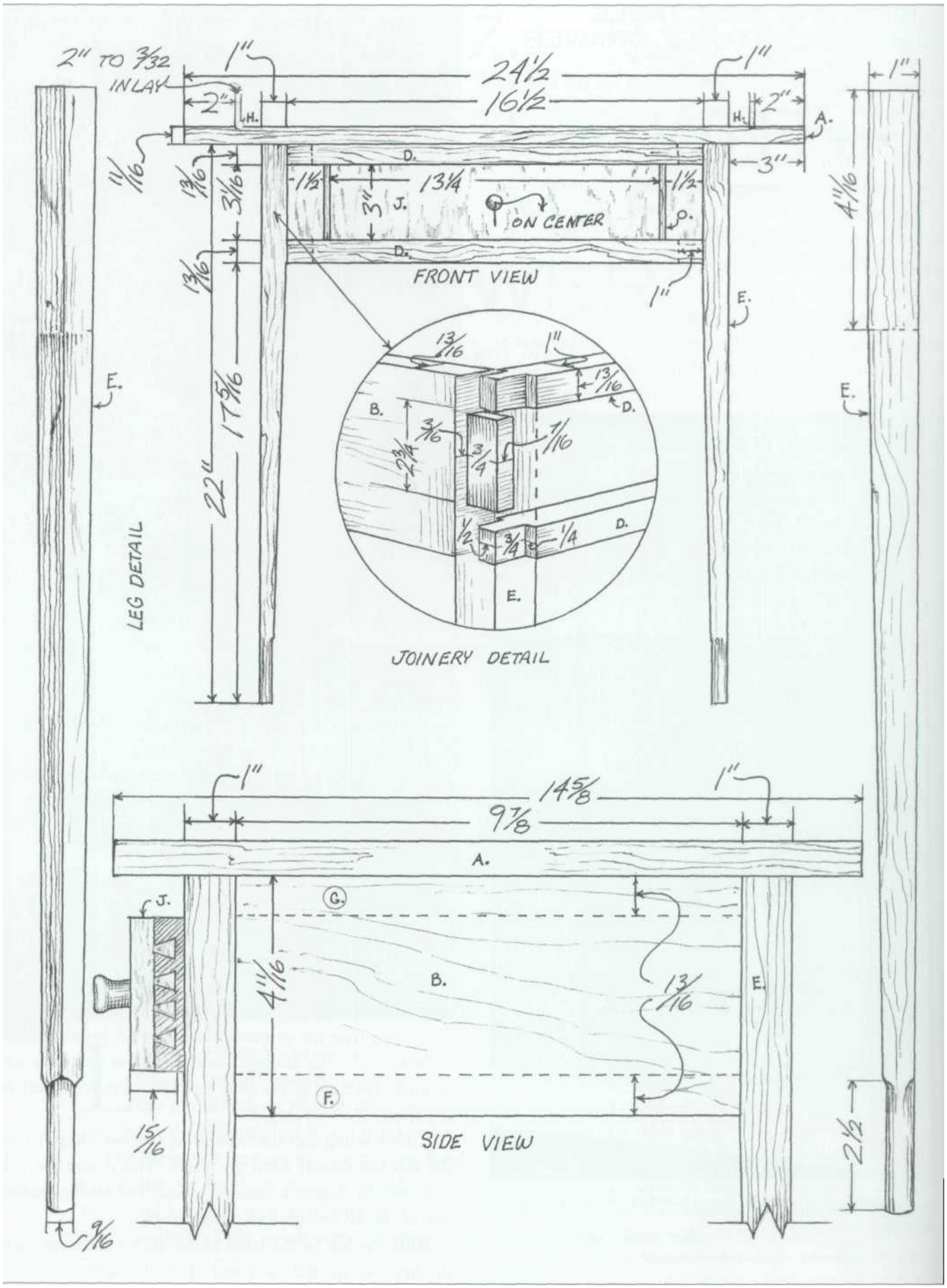
Then mount the leg in the lathe. In order to eliminate the fraying of corners that can occur when a round shape is turned immediately adjacent to a square shape along the length of a turned part, relieve the four corners of the leg with a knife just above the turned foot. Blend this cut into the round tip of the leg with a lathe tool. Finally, clean up with a chisel, knife and sandpaper.

Next, cut the mortises that will receive the tenons on the ends of the apron parts and drawer rails. Set these so that the outside faces of the apron parts are recessed 1/8″ from the outside faces of the legs. Set the drawer rails, however, so that their outside faces are flush with the outside faces of the legs. When the mortises are fit, assemble the table frame. Next, install drawer runners and kicker strips. Fit the kicker strips with oversized holes, through which screws will pass into the top. The oversized holes allow for expansion and contraction across the width of the top in response to seasonal changes in humidity.

Next, make the drawer. Construction is standard, with through dovetails at the back and half-blind dovetails at the front.

After leveling and smoothing the top (see chapter five), the top and drawer front are inlaid. This process, which is covered in chapter seventeen, is built around the capabilities of the hollow-ground planer blade.

Affix the top to the table frame, turn a pull from a bit of cherry scrap, and sand and finish the table.



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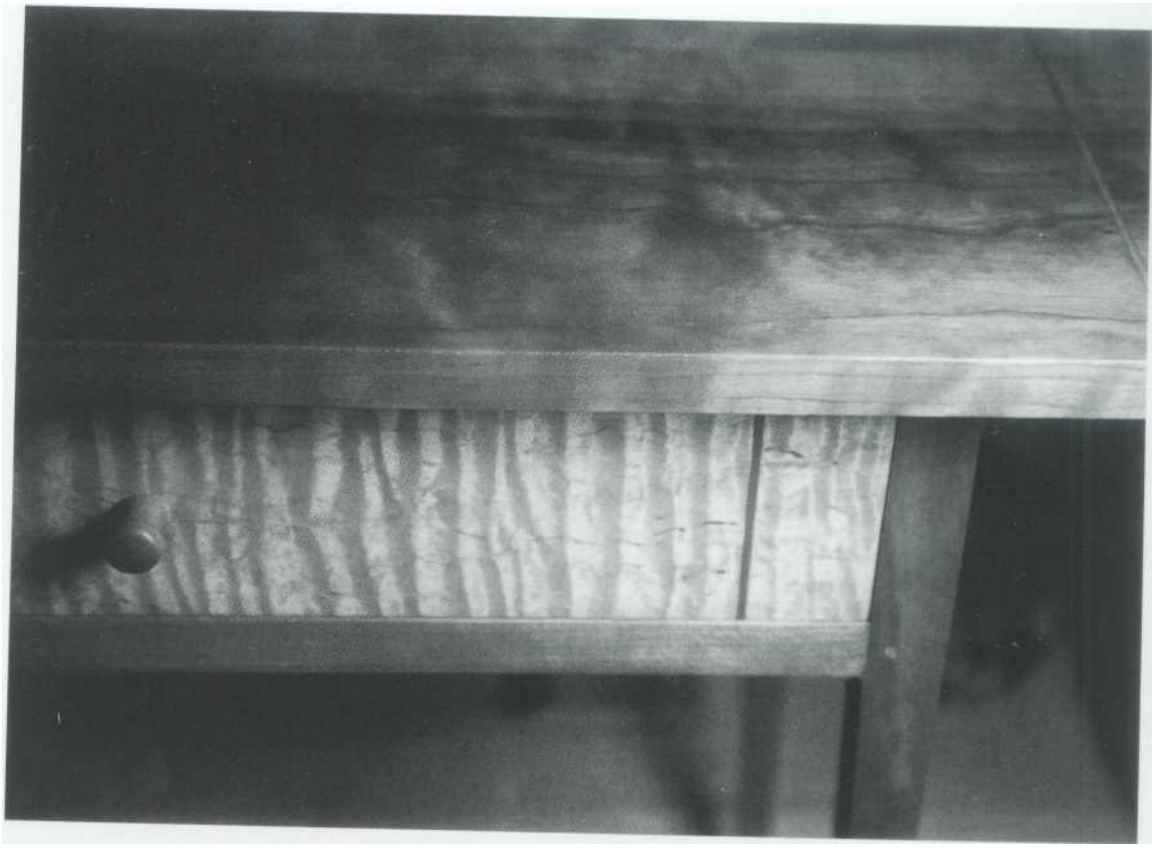
A strip of cherry is inlaid across the width of the drawer's curly maple front. Similarly, a strip of curly maple is inlaid across the width of the table's cherry top. Note the peg driven into the tenon of the drawer rail below the drawer front.



MATERIALS LIST

Table			
A	Top	1 pc.	1 1/16 × 14 3/8 × 24 1/2
B	Apron side	2 pcs.	13/16 × 4 11/16 × 11 3/8
C	Apron back	1 pc.	13/16 × 4 11/16 × 18
D	Drawer rail	2 pcs.	13/16 × 1 × 18*
E	Leg	4 pcs.	1 × 1 × 22
F	Drawer runner	2 pcs.	13/16 × 1 × 9 7/8
G	Kicker strip	2 pcs.	13/16 × 1 × 9 7/8
H	Inlay	2 pcs.	3/32 × 3/32 × 14 5/8
I	Screws	various	
Drawer			
J	Front	1 pc.	15/16 × 3 × 16 7/16
K	Side	2 pcs.	1/2 × 3 × 10
L	Back	1 pc.	1/2 × 2 1/2 × 16 7/16
M	Bottom	1 pc.	1/2 × 9 5/8 × 15 15/16
N	Pull	1 pc.	5/8 × 1 1/4
O	Inlay	2 pc.	3/32 × 3/32 × 3

**Includes ¾" tenons on either end.*
**These are net measurements. Surplus should be added to dovetailed parts to allow them to be sanded flush.*

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FOOTSTOOL

Cherry, Walnut, Oak

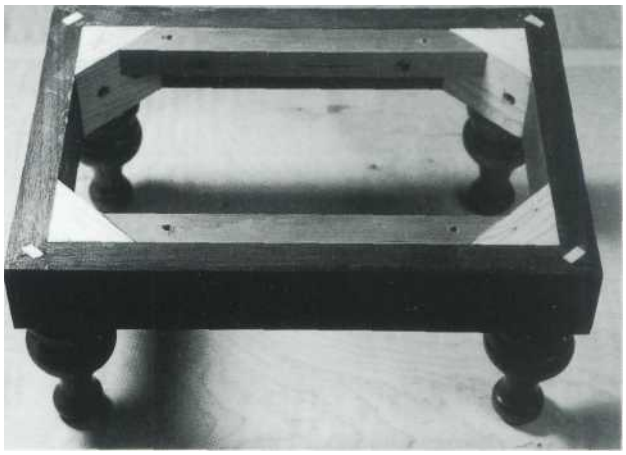
MAKING THE FOOTSTOOL

Construction begins with the legs since they are the most time-consuming components. Rip out 2X2 stock, cut to length, and center on the lathe. First, turn the 1/2 X 7/8" tenon on the top of the leg. Care must be taken in sizing the tenon so that a tight fit can be achieved. In my shop, 1 begin tenon sizing with a gouge, reducing the stock to 1/16″ over its finished diameter. Then, with a flat (paring) chisel laid bevel side down on the tool rest, I bring the tenon to its final size, checking frequently with calipers. (Charles Harvey, a chairmaker in Berea, Kentucky, uses an open-end wrench to check tenon diameter.)

After sizing the tenon, give the leg its rough shape. Then form the coves and beads.

The frame is next. After dimensioning the stock, cut miters on each end of the frame components. Then, on a table saw fit with stack of dado cutters tilted to a 45° angle, cut the dado for the spline on each end of every mitered piece.

Then rip out spline stock to a width of 2 1/16". Thickness to *1/4"*. When you have achieved a tight fit in the dadoes, crosscut the individual splines from the length of spline stock. Remember that the grain of the finished spline must run perpendicular to the mitered faces of the pieces being joined.



This photo shows the structural parts of the stool.

Assemble the splined and mitered frame. When the glue has dried, glue the triangular glue blocks in each corner and screw them into place. Take exact measurements for the screw strips and cut and install the strips.

The top of the footstool is a piece of 5/8″ wood stock on which a piece of 1/2" foam padding has been placed. This is held in place by upholstery cloth wrapped around the top and stapled underneath.

Turn four screws up through the screw strips into the bottom side of the top to hold it in place.

AIR-DRYING LUMBER

Lumber is expensive.

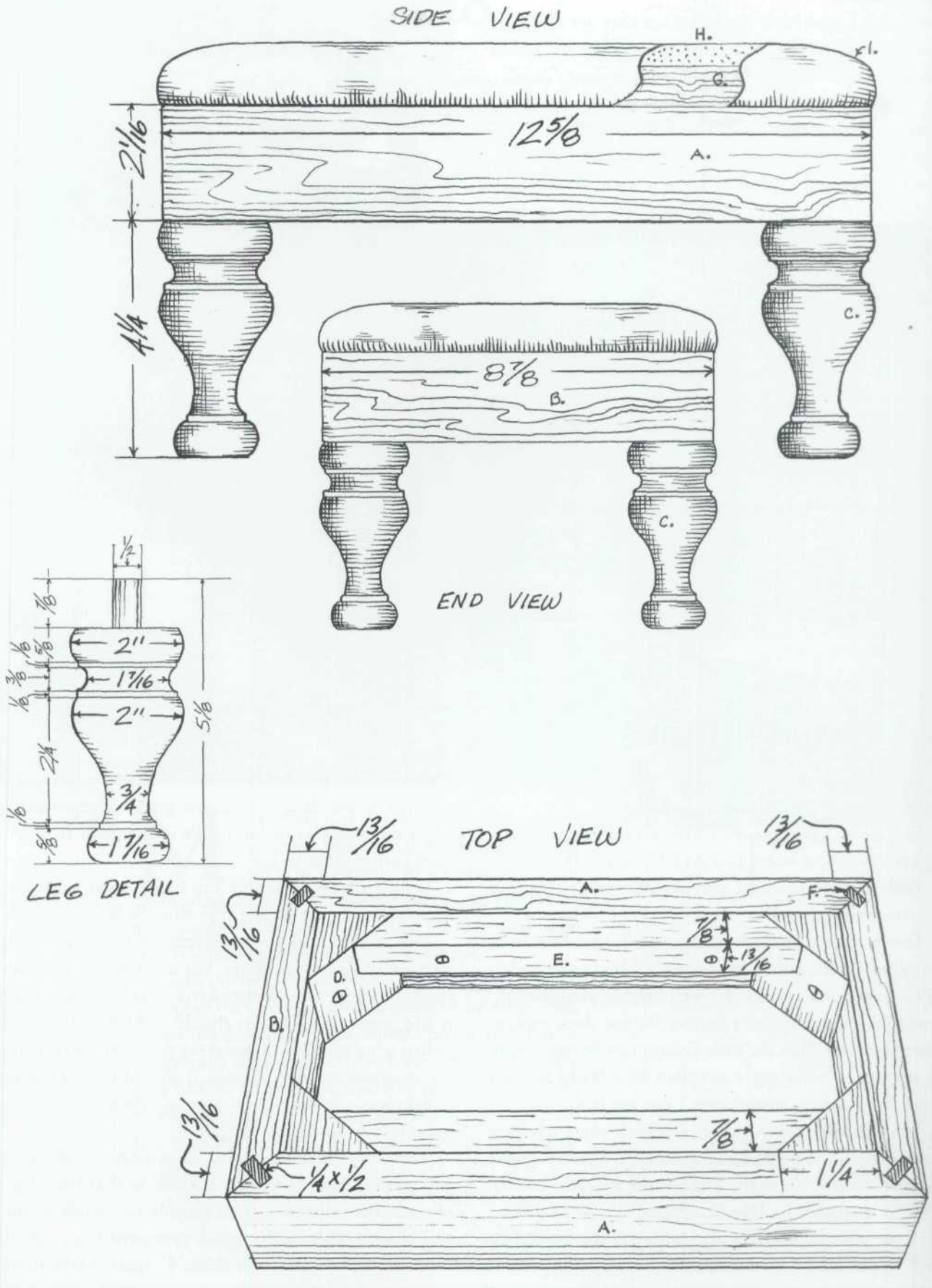
Beautiful lumber is very expensive.

One way to avoid these high prices is to switch from the expensive kiln-dried lumber available at retail outlets to the much less expensive green lumber available at sawmills. Preparing green lumber for use does require labor and time, but the cash savings can be enormous.

Before the green lumber can be air-dried, a solid foundation for the drying pile must be built.

First, you must choose an acceptable location. Drying piles are not beautiful things. For that reason a backyard might be a better choice than a front yard. Air movement is also important. The site should also be open enough so that wind can blow through the pile to aid in reducing the moisture content. Finally, it should be situated on a slight grade so that water can run off whatever roofing material is placed atop the pile.

Begin the foundation with six concrete blocks set in two parallel rows of three. Set these so that the length of each row (measured from outside to outside of the end blocks) is about 8'. Again, measured from outside to outside, place the rows about 4' apart. Make some



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effort to get the tops of these blocks into the same plane. Later, you can use shimming to correct minor inaccuracies.

Next, lay a row of railroad ties along each row of three blocks. Set these so that their top surfaces are in the same plane. You can check this by sighting across the ties from the side, shimming where necessary.

Then, set five 4' lengths of 4X4 across the ties at 20"-24" intervals. Again, these must be in the same plane because any twist in the foundation will be transferred to the drying lumber, in some cases making it unusable. Sight along the length of the pile from either end to reveal any twist in the alignment of the top surfaces of the 4 X 4s.

Air-drying lumber requires a large quantity of stickers, sometimes called sticks. These are nothing more than 1" X 1" X 48" dry hardwood rips which separate the layers of drying lumber so that air can pass freely through the pile.

Once you have ripped out the stickers, the actual lumber pile can be constructed. First, place a single 1" X 1" X 48" sticker along the center line of each 4x4 support. Then, place a layer of green lumber perpendicular to and atop that first layer of stickers. As you are laying out these boards, take care so that an air space (approximately 1") is left between the edges of the boards.

MATERIALS LIST

A Side	2 pcs.	13/16 × 2 1/16 × 12 5/8
B End	2 pcs.	13/16 × 2 1/16 × 8 7/8
C Leg	4 pcs.	2 × 2 × 5 1/8
D Glue block	4 pcs.	1 1/4 × 2 1/16 × 2 5/8
E Screw strip	2 pcs.	13/16 × 7/8 × 8 7/8, length to fit
F Spline	4 pcs.	1/4 × 2 1/16 × 1/2
G Top	1 pc.	5/8 × 8 7/8 × 12 5/8
H Foam	1 pc.	1/2 × 8 7/8 × 12 5/8
I Fabric	1 pc.	14 × 18
J Screws	various	

When that first layer of lumber has been positioned, place a second set of stickers across that layer directly above the first row of stickers. Then add a second layer of lumber, followed by another set of stickers and another layer of boards and so on until you have stickered all the green lumber.

Professional driers often build these piles to a height of 12'-14', but I find that if the top of the pile is more than five or six feet above the ground, it becomes too difficult to get the lumber up and down.

Complete the pile with a water-shedding top. It

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doesn't need to be fancy. A couple of sheets of roofing metal will do, as will a tarp, or even a layer of knotted and checked lumber—anything that will keep water from percolating down through the pile.

Now, wait. The traditional rule-of-thumb states that material should air-dry outdoors one year for each inch of its thickness. I usually exceed that time allotment, although on a couple of occasions, in a pinch, I brought lumber inside after only six months. However, those six-months did include the prime drying seasons of summer and fall.

After air-drying outdoors, you can take the lumber to a commercial kiln for finish drying or bring it inside and sticker it again in a warm, dry room for a few additional months

It's then ready to use.

Much has been written about the importance of using kiln-dried material, and retail outlets often brag about the fact that the moisture content of their stock has been reduced to 7 percent.

I think this is misleading. Yes, the lumber might have had a moisture content of 7 percent on the day it was taken from the kiln. But wood is not an inert medium. After leaving the kiln, its moisture content immediately begins the process of moving toward a point of equilibrium with the relative humidity of the surrounding air.

That means that if a craftsman took that 7 percent board to his shop in Death Valley, California, that 7 percent would soon become 4 percent or 3 percent. And if I took that same 7 percent board to my shop in central Ohio during the steamy month of July, that 7 percent moisture content would quickly become 11 percent or 12 percent, which is the same as the moisture content of the material I've prepared for use by air-drying.

The 1" X 1" stickers are arranged perpendicular to the layers of drying boards. These stickers provide a space through which air can move to hasten the drying process.

TRESTLE TABLE

Walnut

MAKING THE TRESTLE TABLE

After the material has been dimensioned, lay out, joint and glue the stock for the top. Construct the leg assemblies next.

After laying out the feet but before profiling them on the band saw, cut the 2"-deep mortises that will receive the leg tenons. This can be done on the drill press, clamping the work to a tall fence custom-made for this operation. You can also cut the mortises by hand, securing the work in a vise, then removing the bulk of the waste with a drill bit, and cleaning up the mortise walls with a chisel. Similarly, cut the through mortises in the two cross braces. Profile the feet and cross braces on the band saw.

Then, fashion the leg tenons. You can do this on a table saw fit with a stack of dado cutters or by hand using a tenon saw. After fitting the tenons into their mortises, glue-up the two leg assemblies.

Shape the stretcher and fasten it to the top of the cross braces with half-notch joints. The top is held in place with wood screws passing through oversized holes in the braces. These oversized holes allow for expansion and contraction of the top in response to seasonal changes in humidity.

The original table was built of cherry with pine used for the drawer back, sides and bottom. The exception was the drawer front, which was made of maple. Because of this, Kassay suggests the possibility that the drawer might have been added at some time after the completion of the original table, a notion further supported by the drawer's extremely (and impractically) short front-to-back depth, a feature that suggests that the drawer wasn't fully integrated into the table's design.

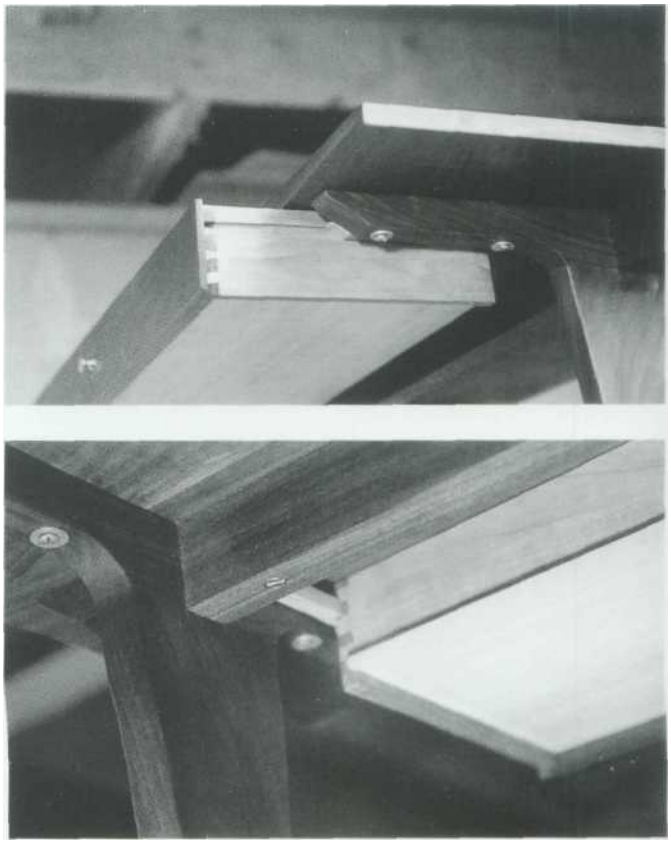
With the exception of the grooves that must be ploughed on the outside faces of the drawer sides, drawer construction is conventional, with through dovetails at the rear and half-blind dovetails at the front.

After fitting the drawer, sand and finish the table and drawer.

MATERIALS LIST

Table			
A	Top	1 pc.	½ × 17½ × 30⅝
B	Leg	2 pcs.	⅞ × 3⅝ × 20⅞
C	Foot	2 pcs.	⅞ × 7½ × 16⅛
D	Cross brace	2 pcs.	⅞ × 1⅝ × 16½
E	Stretcher	1 pc.	1 × 1⅝ × 28¾
F	Drawer runner	2 pcs.	¼ × ⅜ × 7
G	Screws	various	
Drawer			
H	Front	1 pc.	½ × 2⁵⁄₁₆ × 21¾
I	Side	2 pcs.	⅜ × 2⁵⁄₁₆ × 7⅛
J	Back	1 pc.	⅜ × 1¾ × 21⅜
K	Bottom	1 pc.	¼ × 7 × 21⅜
L	Pull	1 pc.	½ × ½

**These are net measurements. A surplus should be added to dovetailed parts to allow them to be sanded flush.*
**Pull was ordered from Constantine's Hardware.*



1 These photos show the underside of the table. Note the washers under the heads of the screws holding on the top. These are necessary because of the oversized holes drilled through the cross braces. Note also the drawer runner affixed to the inside face of the cross brace.

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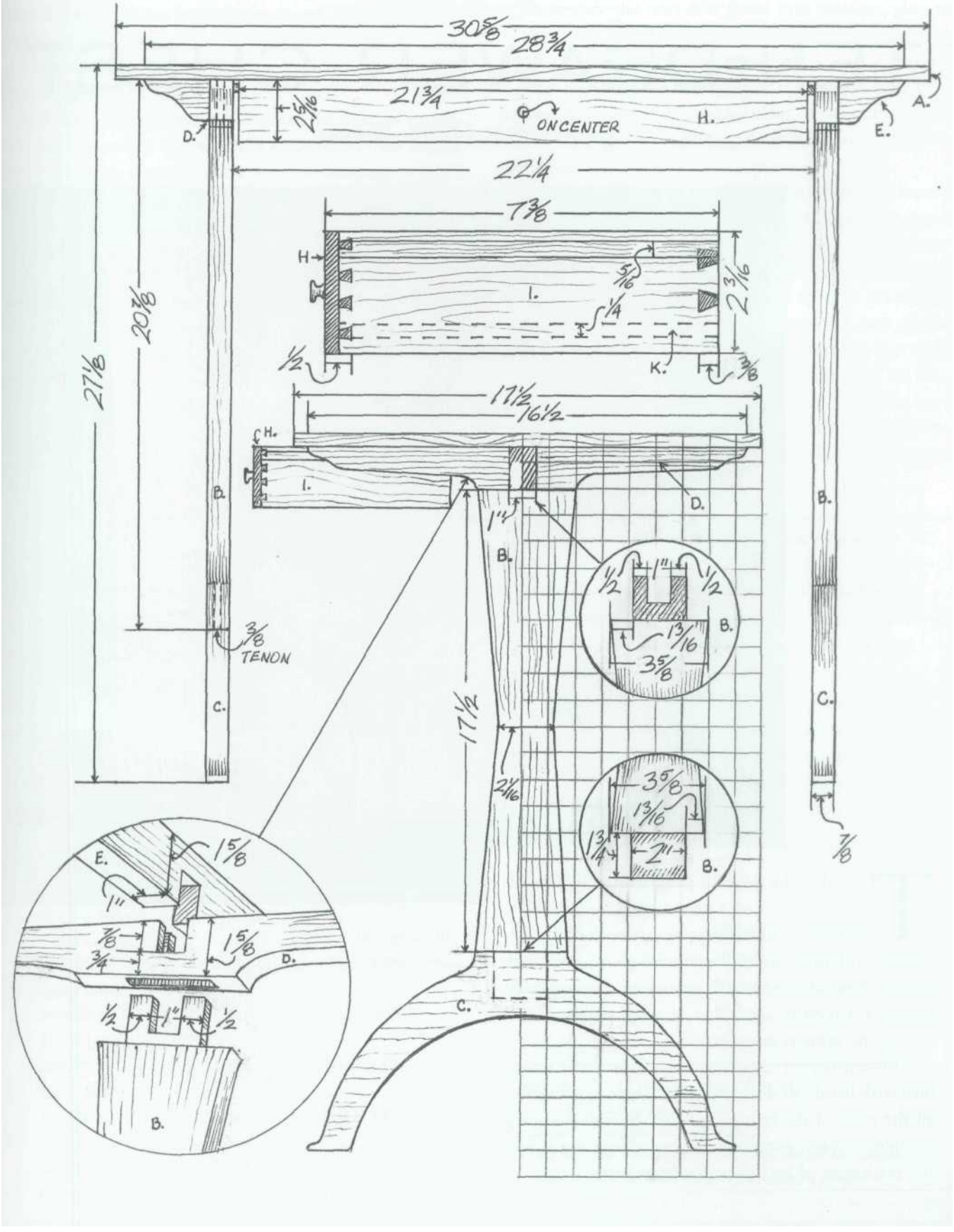

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TEN DRAWER CHEST

Curly Maple, Cherry, Walnut

MAKING THE TEN-DRAWER CHEST

After the material has been dimensioned, glue-up the top panel and set it aside.

Then cut joints for the face frame. When these have been fit, glue the frame.

Build the end panels next. Because of the seasonal expansion and contraction that will take place across their width, they are built as framed panels with the tongues on the perimeter of the central panel floating in grooves cut into the inside edges of the frame components, which are held together with mortise-and-tenon joinery.

After the end panels have been glued-up, cut dadoes across their width for the tongues on the ends of the dust panels. Then, glue the front edges of the end panels to the back of the face frame.

Assemble the interior of the case in layers beginning at the bottom. First slide the tongues on the bottom dust panel into the dadoes cut on the inside faces of the end panels. Glue and clamp the front edge of the dust panel to the back side of the face frame. After removing the clamps, install the drawer guides and stops for the bottom tier of drawers.

Then, slide the next dust panel into position, glue and clamp it, and install its drawer guides and stops. Continue up the chest until each layer of interior work is completed.

After installing the filler strip at the bottom back of the cabinet, fasten the four mitered sides of the bottom frame in place with screws passing up into the bottom of the end panels and face frame.

Assemble the top frame, with kicker strips, as a separate unit. Before installing it in the cabinet, fasten the top to the frame with screws passing up through slotted screw holes. These holes allow the top to expand and contract across its width in response to seasonal changes in humidity.

Set the top frame, with the top attached, into place. Hold it there with screws passing through the top of the face frame and the tops of the end panels. Nail on the upper moulding, concealing these screws. Nail the lower moulding into place. Drawer construction is straightforward, with through dovetails at the back of the drawers and half-blind dovetails at the front.

MATERIALS LIST

Case			
A	Top	1 pc.	11/16 × 15 13/16 × 21 5/8
B	Short bottom frame	2 pcs.	11/16 × 1 11/16 × 15 13/16
C	Long bottom frame	2 pcs.	11/16 × 1 11/16 × 21 5/8
D	Central end panel	2 pcs.	5/8 × 10 1/8 × 14 7/8 [1]
E	Top of end panel frame	2 pcs.	7/8 × 3 5/8 × 10 5/8 [2]
F	Bottom of end panel frame	2 pcs.	7/8 × 5 3/16 × 10 5/8 [2]
G	Back of end panel frame	2 pcs.	7/8 × 2 15/16 × 22 11/16
H	Front of end panel frame	2 pcs.	7/8 × 2 1/8 × 22 11/16
I	Back planking	various	1/2 × various × 22 11/16
J	Short upper moulding	2 pcs.	5/16 × 13/16 × 15 7/16
K	Long upper moulding	1 pc.	5/16 × 13/16 × 20 3/4
L	Short lower moulding	2 pcs.	3/8 × 1 1/16 × 15 9/16
M	Long lower moulding	1 pc.	3/8 × 1 1/16 × 20 7/8
N	Outside vertical facing	2 pcs.	7/8 × 1 1/4 × 22 11/16
O	Central vertical facing	1 pc.	7/8 × 1 1/4 × 20
P	Top horizontal facing	1 pc.	7/8 × 1 3/4 × 18 7/8
Q	Bottom horizontal facing	1 pc.	7/8 × 2 3/16 × 18 7/8
R	Short facing	8 pcs.	7/8 × 15/16 × 9 3/16
S	Dust panel	5 pcs.	3/4 × 13 3/4 × 18 3/4 [3]
T	Drawer stop	10 pcs.	3/16 × 7/8 × 7
U	Central drawer guide	5 pcs.	3/4 × 1 7/16 × 13 3/4
V	Outside drawer guide	10 pcs.	7/16 × 7/8 × 13 3/4
W	Kicker strip	2 pcs.	13/16 × 1 5/8 × 12 7/8
X	Short top frame	3 pcs.	13/16 × 1 1/8 × 11 1/4
Y	Long top frame	2 pcs.	13/16 × 1 1/8 × 18 1/4
Z	Cleat	1 pc.	13/16 × 1 5/8 × 18 1/4
AA	Bottom filler strip	1 pc.	3/4 × 1 7/16 × 18 1/4
Drawers			
BB	Front	10 pcs.	1/4 × 2 15/16 × 8 1/16
CC	Sides	20 pcs.	3/8 × 2 15/16 × 14 1/8
DD	Back	10 pcs.	3/8 × 2 3/8 × 7 15/16
EE	Bottom	10 pcs.	5/16 × 7 9/16 × 14 1/8
FF	Pull	10 pcs.	1 × 1 1/2

[1] Includes 1/4" × 1/2" tongue on all four edges.
[2] Includes 3/4" tenon on each end.
[3] Includes 1/4" tongue on each end.
**These are net measurements. Surplus should be added to all dovetailed parts to allow them to be sanded flush.*

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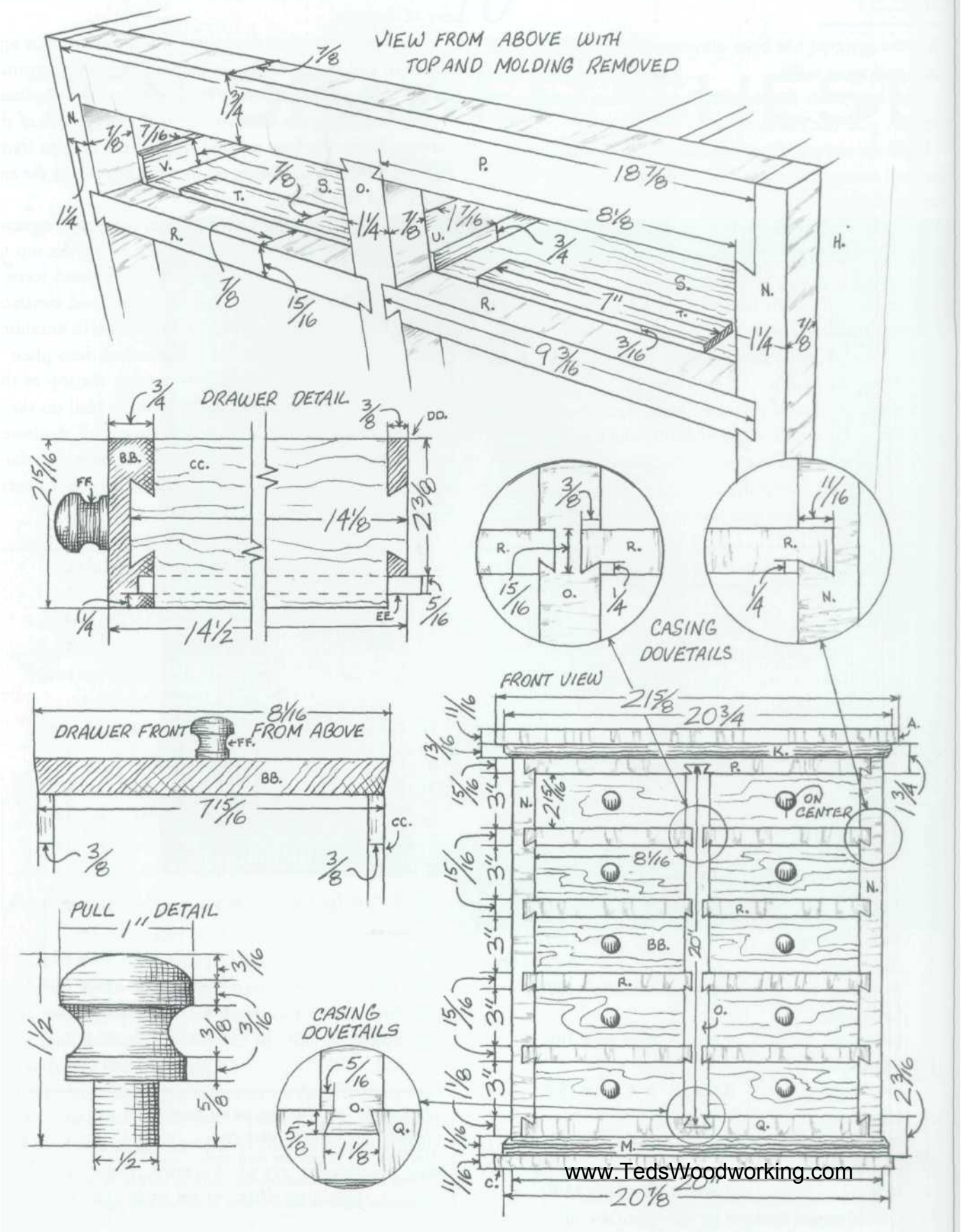

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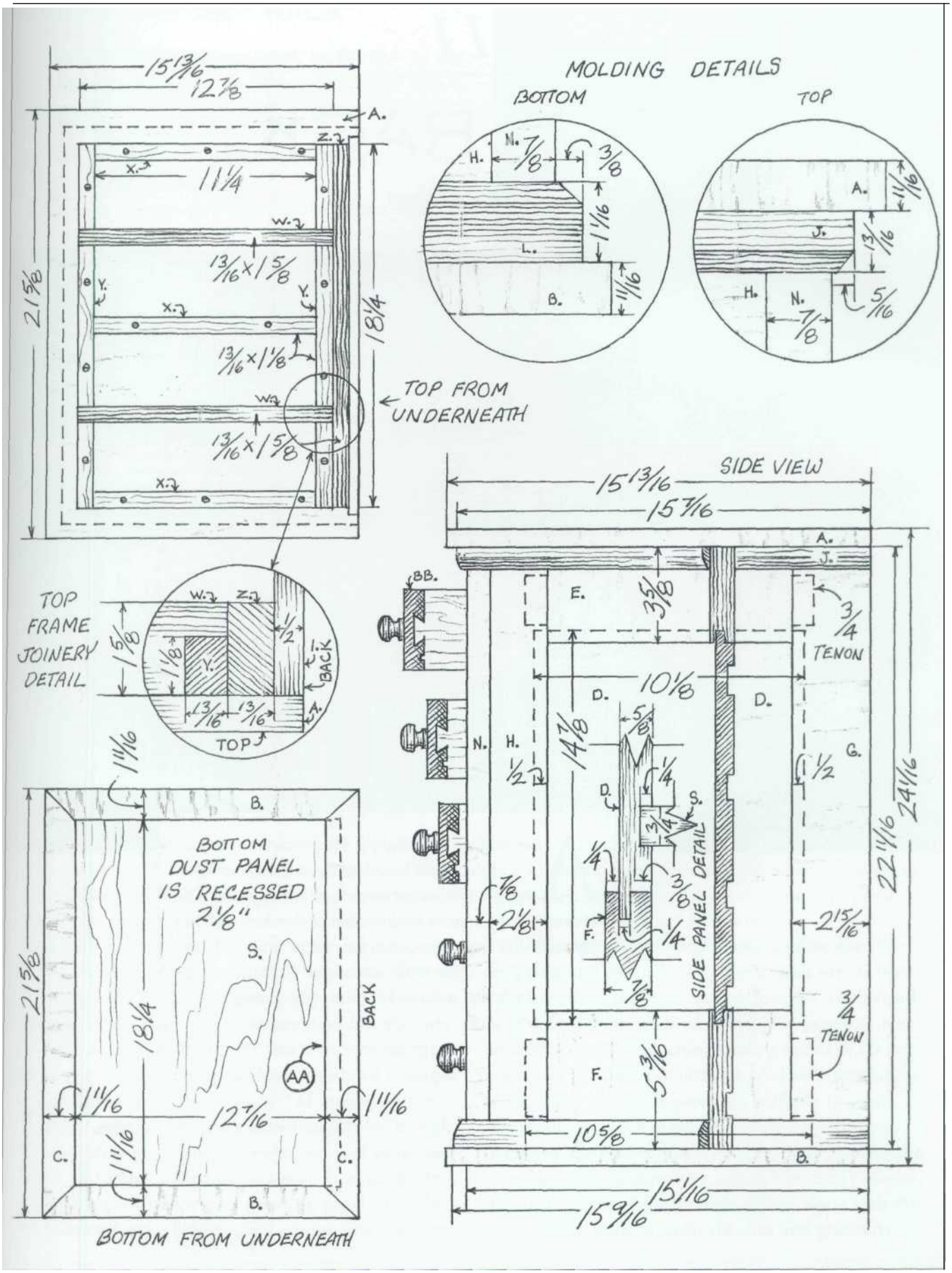

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KEY RACK

Cherry, Walnut

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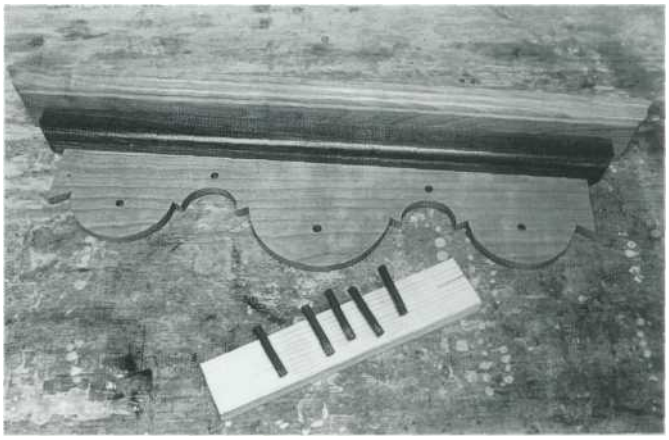
MAKING THE KEY RACK

After the stock has been dimensioned, lay out and cut the scrollwork with the band saw. Remove saw marks with a paring chisel, a wood file and some sandpaper. Care must be taken when cleaning up the scroll's sharp points since they can be easily broken off because of the grain runout on both sides of the points.

Next, form the moulded edges on the walnut mid-section with a shaper or a table-mounted router. Any of a number of different cutters would work nicely for this profile.

Cut a 7/16" X 5/16″ stopped rabbet along the bottom of the walnut mid-section to house the top of the scrollwork. You can do this by hand with a mallet and chisels or on the table saw using the method for cutting the stopped groove discussed in chapter five. You could use a similar method to cut the stopped rabbet with a table-mounted router, although it would take several passes.

Join the shelf and the mid-section with glue and a simple butt joint, as the width of the areas being joined provides ample glue surface. Fasten the scrollwork into its rabbet with glue and several 3/4" no. 6 wood screws.



Because it would have been difficult to wipe excess finish from the scrolled back while working around the five pegs, they were removed during finishing, then glued into place.

You can turn the pegs on a lathe or cut them from a length of 1/4″ walnut dowel available from Constantine's. Glue these into the 1/4″ mortises drilled in the scrollwork.

WOODWORKING MISTAKES

In the second issue of *Home Furniture* magazine, Alan Breed wrote an account of his experiences during the construction of a reproduction of one of the masterpieces of American cabinetmaking: a six-shell secretary built by John Goddard late in the eighteenth century. Before beginning any shop work, Breed took detailed measurements, rubbings and photos of the original, which awaited auction at Christie's in New York. (The original later sold for $12.1 million.) Although he found the level of craftsmanship to be superb, he also found mistakes "like planing a little too deeply on the upper door stiles and exposing the mortises for the rail tenons."

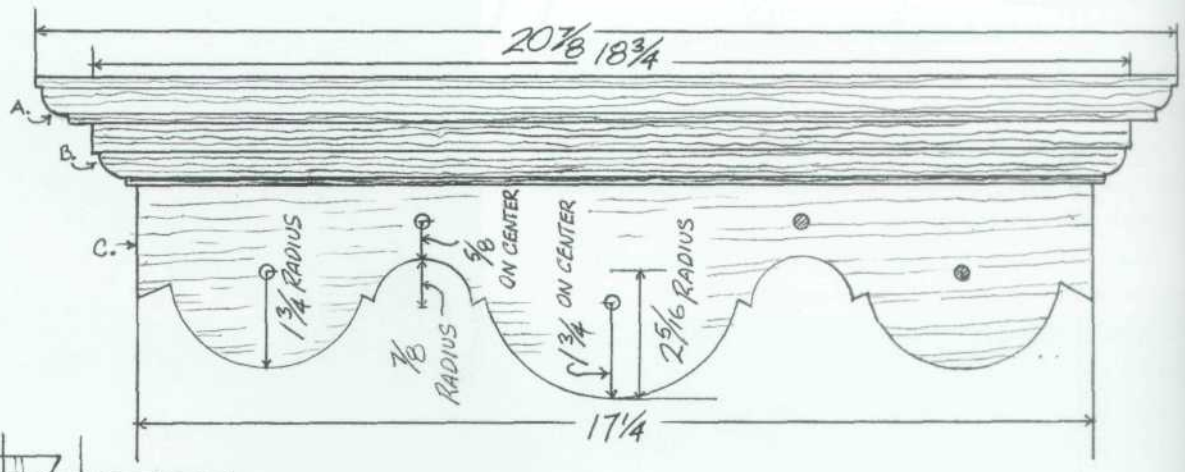
For those of us whose skills fall a good bit short of John Goddard's, this is reassuring. Just as we sometimes struggle in the shop, so did he.

With each piece I built for this book, for example, there is at least one nagging detail I wish I'd managed a little better. It might be an area of roughened finish. (I could have wiped the piece more thoroughly.) It might be a gap showing beside a through tenon. (I could have taken more time paring the mortise.) It might be an imperfect color match on a glued-up panel. (I could have dressed more lumber prior to choosing the pieces I would use.)

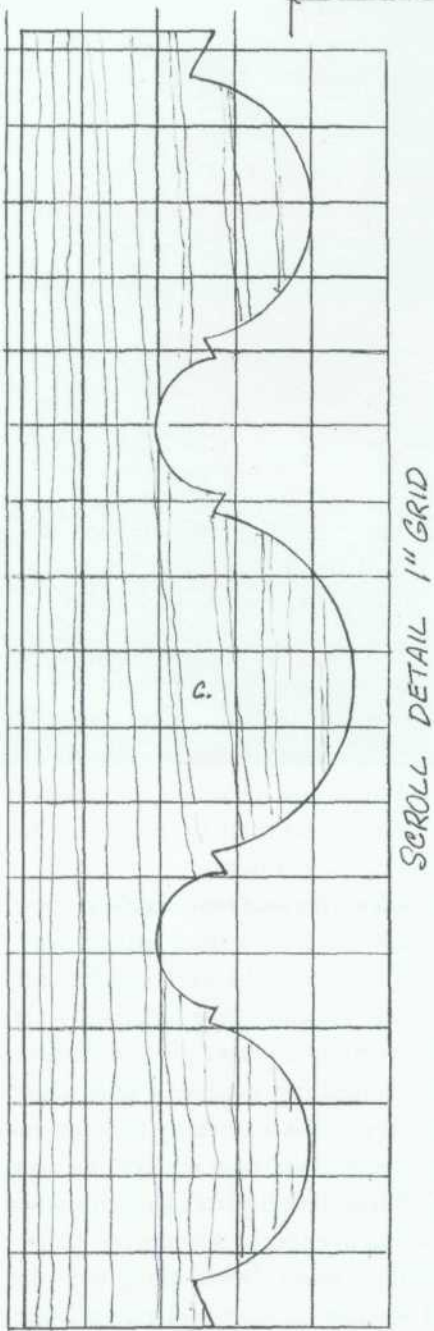
What follows are some of the more common fixes I use in my shop, each of which was employed at least once in the preparation of projects for this book:

1. ***Make a new part.*** Sometimes, after struggling for hours to make a piece come together, this most obvious solution can be emotionally difficult to face, but it is almost always the best solution. An hour spent cutting out a new end panel for a case on which the dovetails simply don't fit is better spent than an hour given to attempts at patching up such a joint.

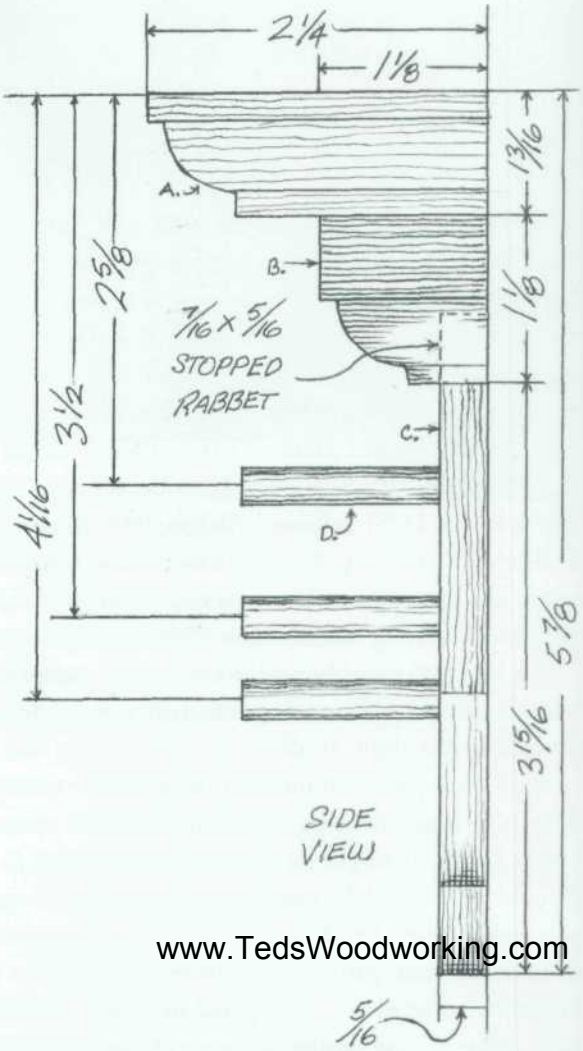
2. ***Mix up some yellow glue and sanding dust.*** Some times a set of dovetails will have a small gap or two beside a pin or tail. If the rest of the work is sufficiently well done, a filler made of yellow glue (aliphatic resin) and dust created by machine-sanding a piece of the same species as that being joined can produce a satisfactory appearance. It's not as good as a perfectly fit joint, but the results are much better than those achieved by using commercially made fillers. This is particularly true when working with photoreactive species like cherry. Com mercially prepared fillers won't darken along with the surrounding wood whereas the dust and glue mixture



FRONT VIEW



SCROLL DETAIL 1" GRID



SIDE
VIEW

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will, having been created from the same photoreactive material.

3. ***Trust the glue.*** Sometimes, no matter how carefully we work, a part will split during a test assembly, but this is rarely the disaster it may at first appear to be.

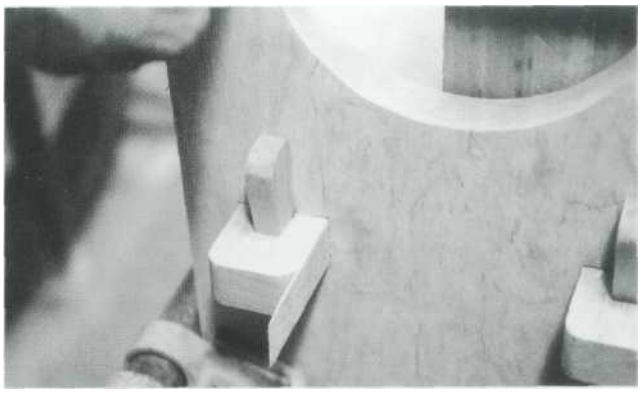
If the split runs the full length of the part and the two sides can be separated cleanly, a coat of glue on each fractured face and an hour in a set of clamps will restore the part to its original strength.

If the split only runs a couple of inches along the length of a longer piece, you can work glue into the split with a little patience. First, apply a generous layer of glue to the part, directly over the split. Then work the split open and closed a number of times, causing the glue to migrate down into the gap. When it appears that the glue has worked all the way through the split, wash the excess off of the surface, and clamp the part until the glue has cured.

4. ***Modify the piece.*** In places that can't be reached with shaving tools, I use a wood file to remove band saw marks from scrollwork. In cleaning up the scrollwork for the key rack at the beginning of this chapter, I got a little too aggressive with the file and flaked off some chips from one of the sharp points near the central arc. I worked that point down until I was beyond the torn-out grain, but when I stepped back from the part, I could see that that particular point was visibly different than the other three.

The solution? With a file, I carefully removed enough material from the other three points so that they matched the one on which I'd made my error.

5. ***Graft in new material.*** While building the figured oak magazine stand (chapter twelve), I got a poor fit on the mortise for one of the eight tusk tenons. The gap was fairly noticeable, and I would have liked to have made a new shelf, but I had no more oak with that particular wavy grain.



A gap was visible on one side of the tusk tenon so a sliver has been grafted onto the tenon to fill it.

To hide the Me" gap, I ripped a thin sliver from a piece of scrap having grain and color similar to the tusk tenon that fit through the bad mortise. Then, with a C-clamp and a couple of scrap pads, I glued the sliver to the side of the tusk tenon after sliding one end of the sliver into the 1/16" gap. When the glue had dried, I cut away the excess and blended the sliver into the curve at the end of the tusk tenon.

The gap hadn't made the joint structurally unsound, and the glued on sliver did conceal the gap, but this wasn't a perfect solution. When that particular tusk tenon is sighted from above, it's clear that there's a little more material on one side of the walnut wedge than there is on the other.

MATERIALS LIST

A	Shelf	1 pc.	13/16 × 2¼ × 20⅞
B	Mid-section	1 pc.	1⅛ × 1⅛ × 18¾
C	Scroll	1 pc.	5/16 × 4⅜ × 17¼
D	Peg	5 pcs.	¼ × 1⅝
E	Screws		¾" no. 6

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Figured Oak Stand

White Oak, Walnut

MAKING THE MAGAZINE STAND

Through tenons completely pierce and, in some cases, extend beyond the outside surface of the board through which they pass. One advantage of this joint over the shorter, more commonly used stopped tenon is increased glue surface.

The through tenon also offers some design opportunities not associated with the stopped tenon. A through tenon can be shaved flush and fit with wedges of contrasting wood, as was done with the through tenons on the ash drying rack pictured in this book (chapter nineteen). Or, as with this magazine stand, the tenons can extend well beyond the outside surface of the board through which they pass and can themselves be given through mortises into which wedges (keys) are driven. These wedges, characteristic of knockdown furniture, provide a mechanical lock for the sides of the case, in addition to adding an appealing visual detail.

After the stock has been thicknessed, ripped to width, and cut to length, lay out and saw the half-circle cutouts that separate the feet and those that form the handgrips with a handheld jigsaw.

Then, cut shelf dadoes. You can do this with a set of dado cutters on the radial arm saw or with a set of cutters on the table saw. At this time, cut the through mortises tor the tusk tenons.

Careful marking is essential. First, using a try square, extend the upper and lower limits of the shelf dadoes around the edges and onto the opposite faces of the end panels. These lines mark the upper and lower limits of the through mortises. Then, mark the widths of these mortises and score their perimeters with a knife held against a straightedge.

This wildly figured oak was perfect for this piece.

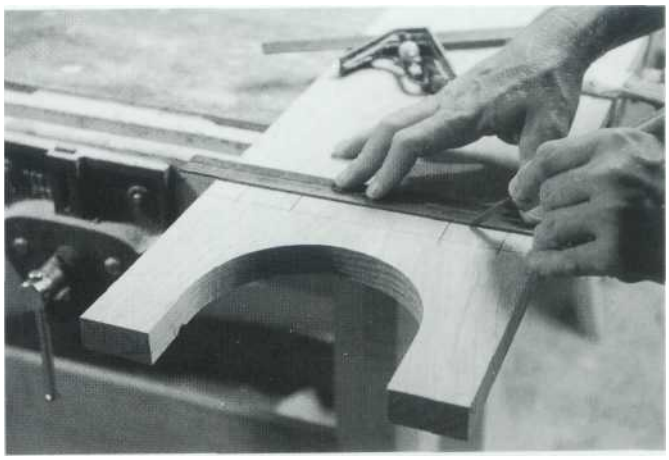
Remember: Aggressive drilling and chisel work can result in chips breaking out around the perimeter of the mortise on the back side of the board. For this reason, use a backup board during drilling, and lay out the mortise on both sides of the board so you can alternate chisel work from one side to the other, working toward the middle.

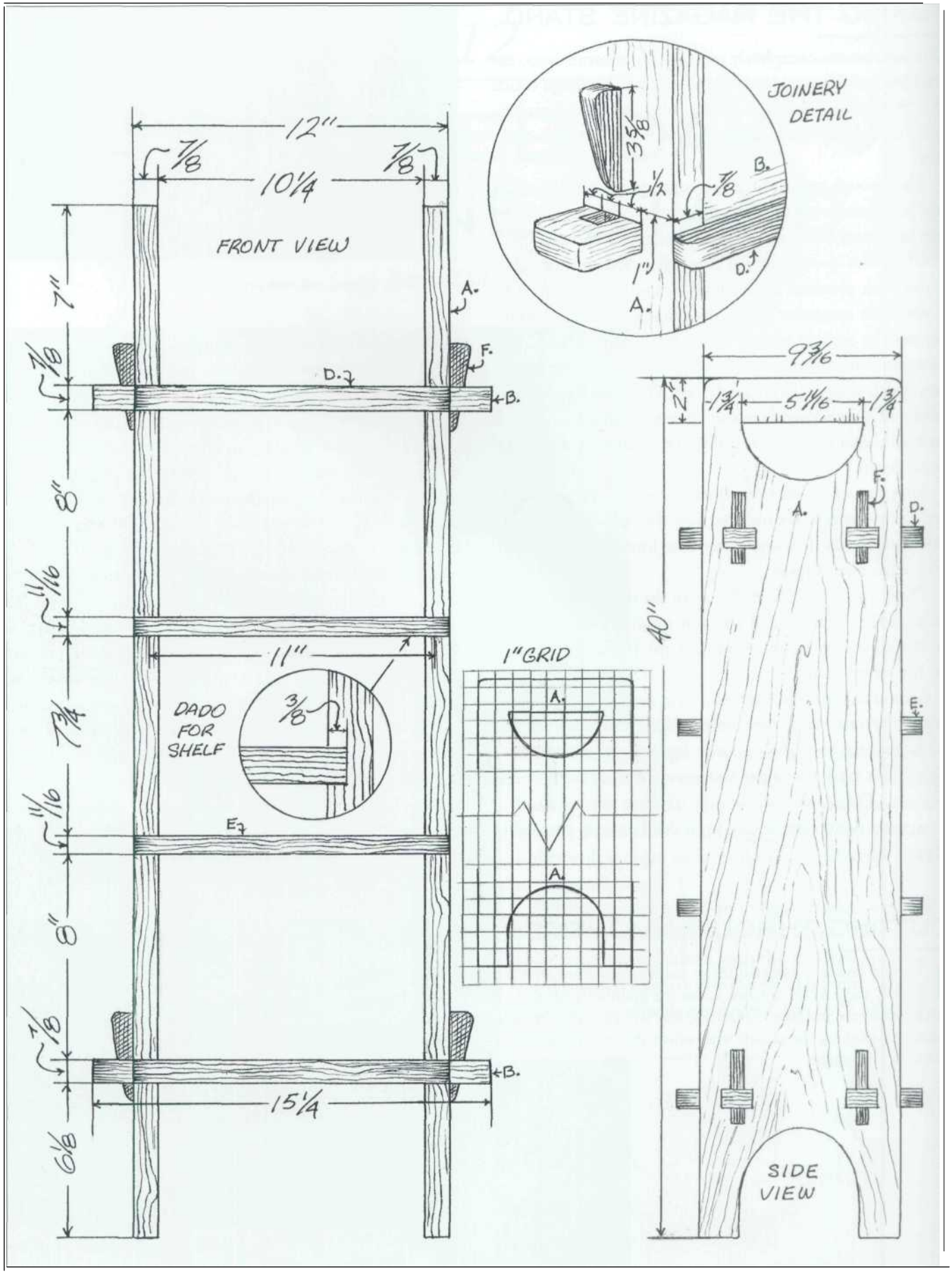
After cutting the mortises and fitting the tusk tenons through them, cut the mortises for the walnut wedges. It's important to dry-clamp the whole assembly tightly before marking these mortises so that they will be correctly located along the length of the tusk tenon. Their placement should cause the wedges to draw the case together as they are driven into their mortises. To achieve this, place the inside edge of the wedge mortise so that it will be approximately 1/8" inside the outside face of the end panel at assembly.

When the wedges have been fit, glue and assemble the case, clamping everything tightly together. After the glue has cured, remove the clamps and apply the walnut shelf-facings. Glue and nail these into place (my choice) or glue them and clamp until dry. The second method eliminates the need to fill nail holes, but it is a bit slower.

CUTTING THROUGH MORTISES

1 Careful layout is essential. After marking locations with a pencil, use a knife to score across the grain only on the perimeter of the mortises. This knife line will provide a reliable means for aligning the chisels with which the mortise will be given its final shape.



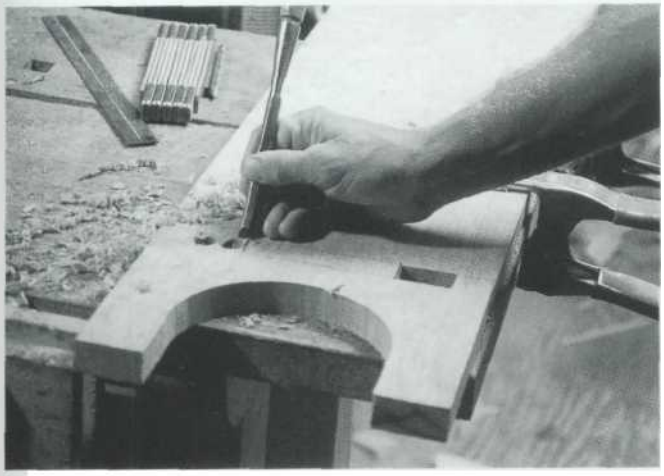

12"
7/8
10 1/4
7/8
FRONT VIEW
7"
A.
F.
D.
B.
8"
11"
DADO FOR SHELF
3/8
E.
8"
15 1/4
JOINERY DETAIL
3 5/8
1/2
7/8
B.
1"
A.
D.
1" GRID
A.
A.
9 3/16
2"
1 3/4
5 11/16
1 3/4
F.
A.
D.
40"
E.
SIDE VIEW

CUTTING THROUGH
MORTISES (CONTINUED)

2 Then, remove waste with a handheld drill and a Forstner bit.

MATERIALS LIST

A	End	2 pcs.	7/8 × 9 3/16 × 40
B	Top and bottom shelf	2 pcs.	7/8 × 9 3/16 × 15 1/4
C	Middle shelf	2 pcs.	11/16 × 9 3/16 × 11
D	Top and bottom shelf facing	4 pcs.	7/8 × 1 × 12
E	Middle shelf facing	4 pcs.	11/16 × 1 × 12
F	Wedge	8 pcs.	1/2 × 13/16 × 3 3/8

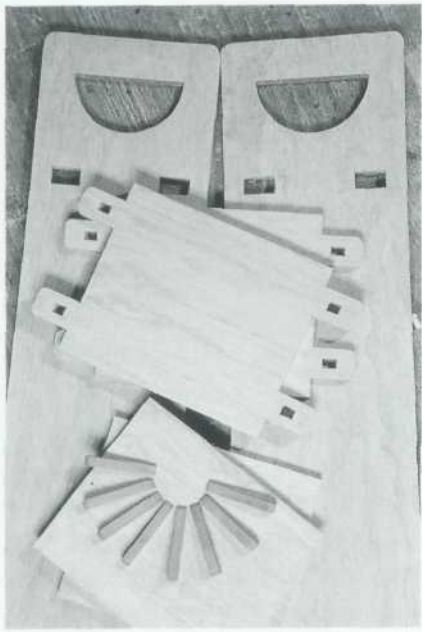


3 With a paring chisel and a wooden mallet, define the walls of the mortise.

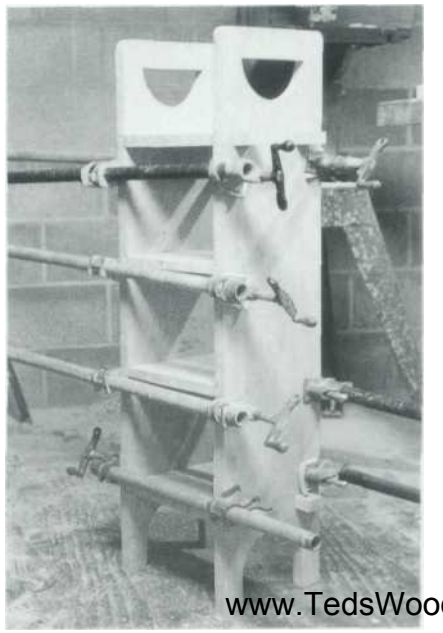
4 Mark the tusk tenons on the upper and lower shelves using the mortises as guides. Then, cut tenons on the band saw.

GLUE-UP

1 Sand parts before assembly, even though additional sanding will be necessary later



2 A large number of clamps are required to bring the case together before you can drive the wedges into place through the tusk tenons.



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BOX WITH RAISED PANELS

MAKING THE BOX WITH RAISED PANELS

After the material has been selected and dimensioned, plough grooves on the inside faces of the box's sides and ends to receive the tongues on the edges of the box's top and bottom. Cut dovetails at each of the box's four vertical comers,

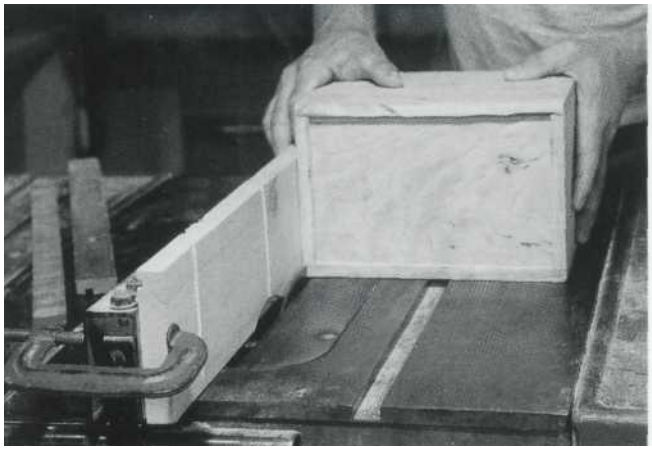
Glue the dovetails and assemble the four walls of the box around the top and bottom. At first, this may seem strange because this makes the box a completely sealed enclosure, allowing no access to the space inside. This problem, however, will be solved very quickly.

Because of the placement of the groove near the top of the inside faces of the front, back and ends, the top panel is already raised 1/8". After the pins and tails at each of the box's vertical corners have been sanded flush, the four vertical panels are raised by cutting a 7/16" X 1/8" pass around all four sides.

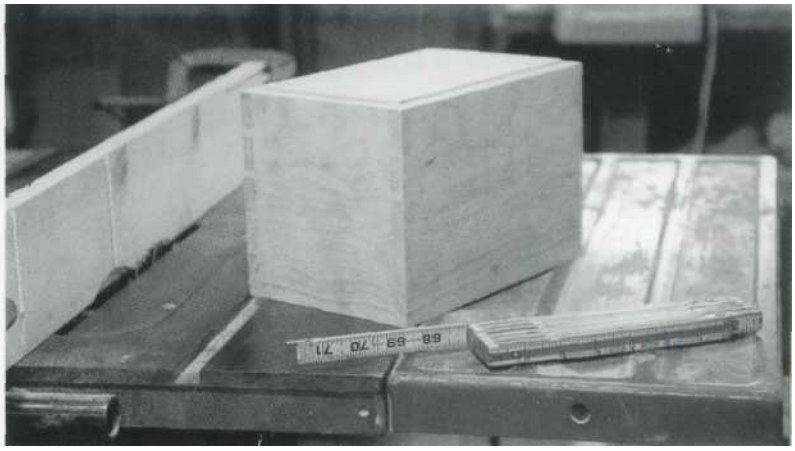
You can do this on either the table saw or on a table-mounted router by removing enough material to give the effect of raising the central portion of each of the vertical panels.

Create a lid by cutting a saw kerf through the four walls of the box $1^{7}/8$" from the top.

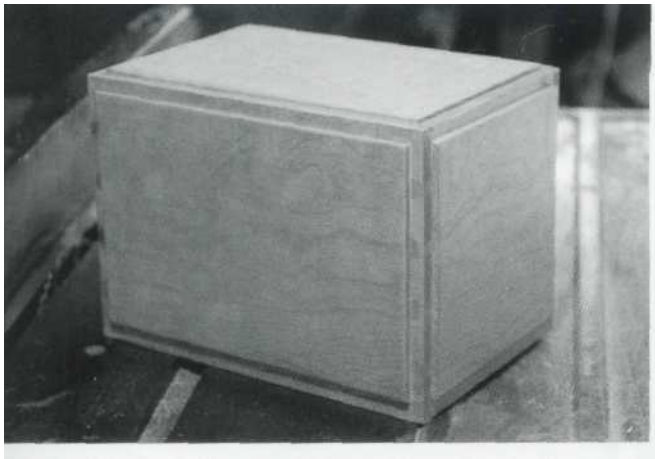
After installing the hardware (see chapter twenty-seven), cut a shallow mortise around the strike plate, and fasten the *1/8"* thick pull into place with glue and a few brads. The box is then ready for sanding and finishing.



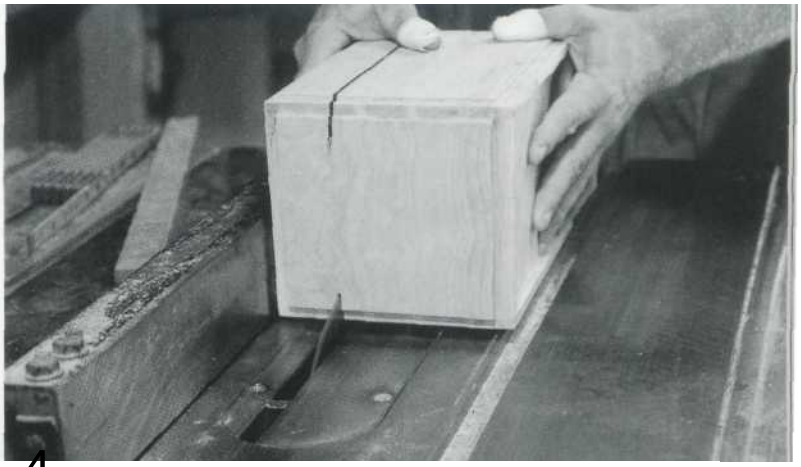
1 Clamp a strip of wood to the saw fence. This wood will protect the blade when the fence is crowded against it. Then, set the blade at a height of 7/16" above the saw table, and bring the fence up to it.



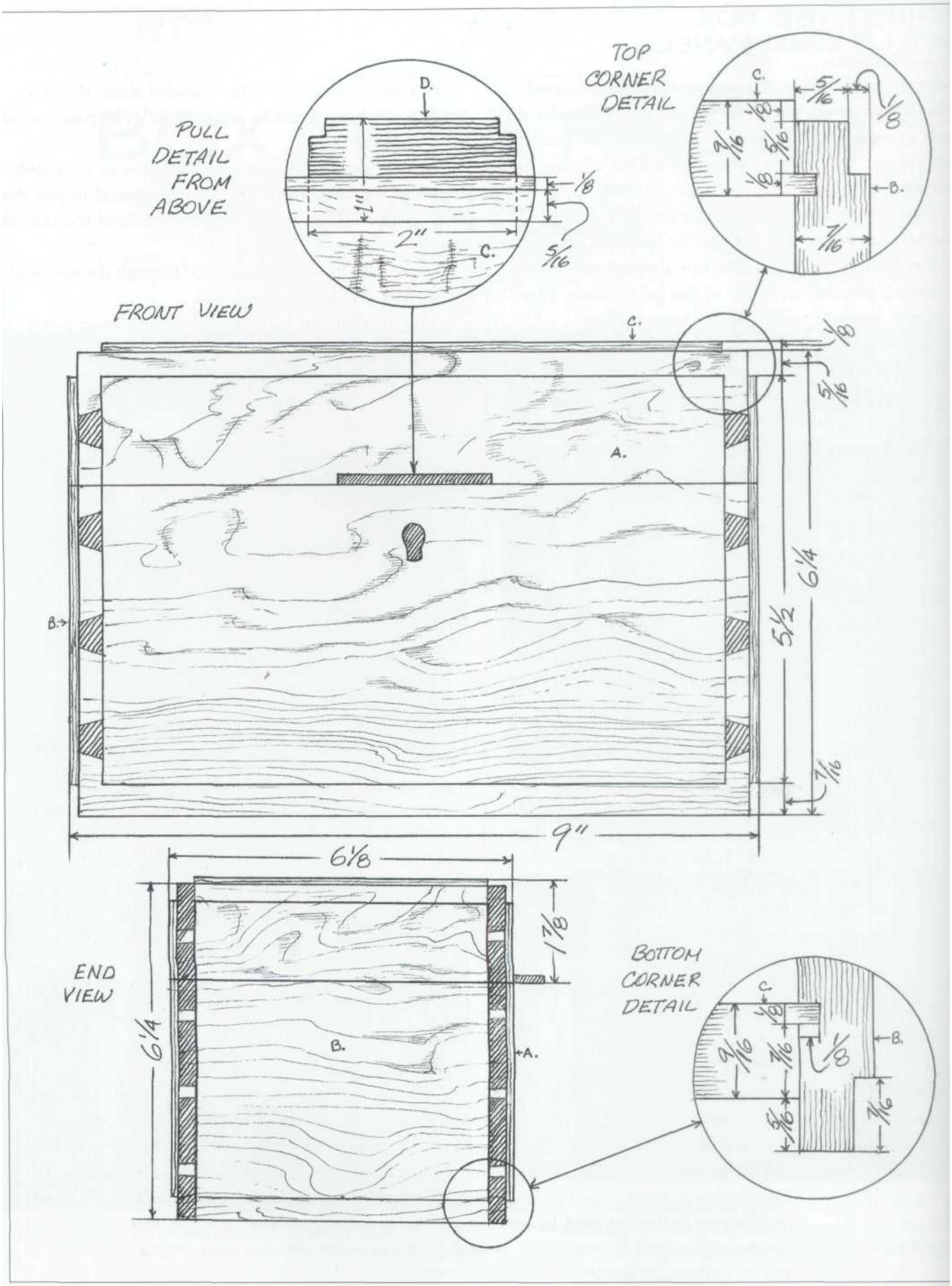
2 The box's four vertical faces are framed by the 7/16" X 3/32" saw kerf created when the perimeter of those faces is passed over the blade.



3 Chisels, files and sandpaper are necessary to remove the grain tear-out and burn marks left along the saw kerfs. (This should bring the saw kerf to its finished thickness of 1/8".)



4 Set the fence 1 7/8" from the blade, cut off the top, creating the lid.



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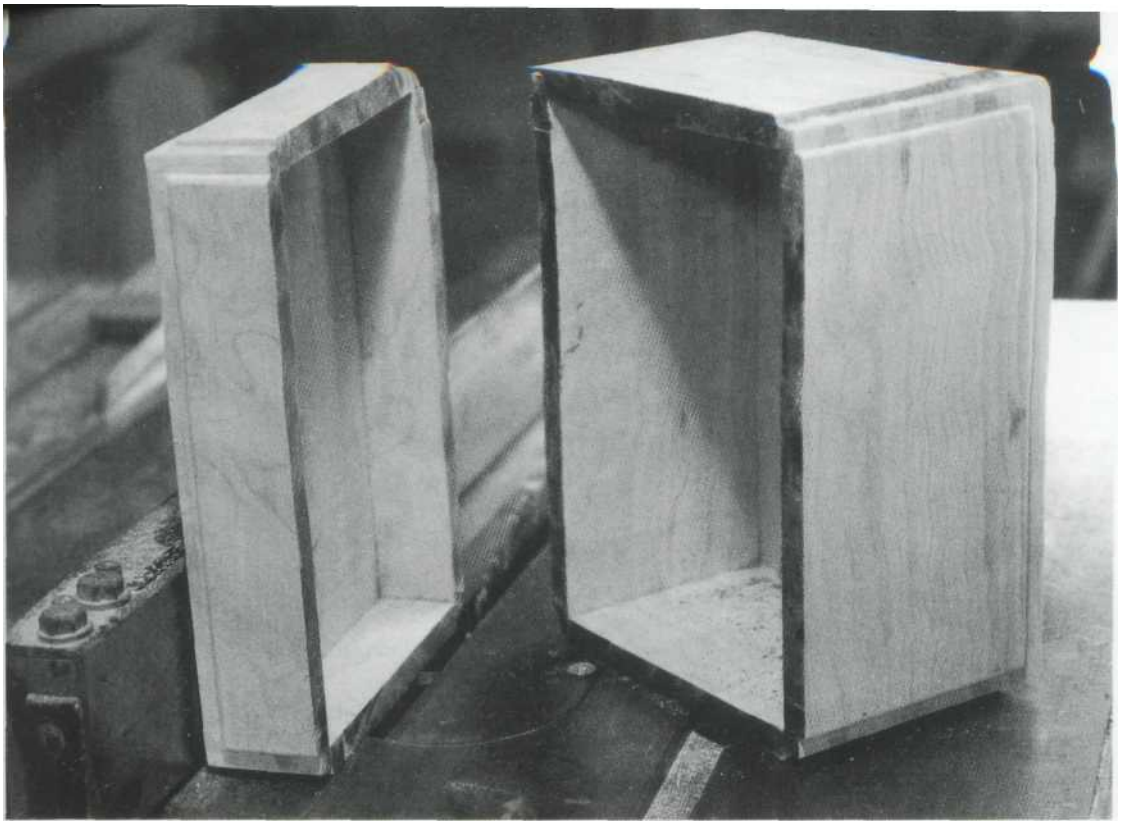

5 Notice the burn marks left by the saw blade. A blade on which the teeth have set won't burn; however, the hollow-ground planer blade is made without set in order to produce a smoother cut and, as a result, often leaves a burned surface.

BURN REMOVAL

I have read that a hollow-ground planer blade can be persuaded to cut without leaving behind the unsightly, blackened surfaces visible in the above photo. I have read that if the blade is razor sharp, free of pitch, and set perfectly parallel to the rip fence, it is possible to cut without burning.

But I haven't been able to manage it.

I clean the blade frequently, and it is kept sharp, and of course I make an effort to properly set the rip fence, but 1 always end up with burned surfaces on one or both sides of the cut.

This could be a result of the fact that machine tool maintenance is not a priority in my shop. Although I have the standard array of power tools, I use them no more than necessary and never take pleasure in their operation. They produce too much noise and too much dirt, making the shop a thoroughly unpleasant place to be.

I have, instead, focused on methods for removing these bum makes from cut surfaces.

Those in the above photo are relatively easy to eliminate. Placing the tip of an extremely sharp 1" butt chisel across the thickness of the blackened wood, I drag the chisel backward (in the direction opposite the bevel) in a scraping motion. Two or three passes removes most of the scorching, in addition to leveling any irregularities left behind by the sawing process. A little work with sandpaper wrapped around a bit of flat scrap then completes the clean-up process.

The scorched areas resulting from the formation of the raised panels on the four sides of this box are a little more difficult. Because the raised panel is immediately adjacent to these flats, they can't be straddled with a chisel. Making the process even more difficult is the fact that the vertical flats on each end of the raised panels run across the grain.

The solution? The only one I know requires patience and a lot of work with a fine-toothed wood file and sandpaper.

I suspect that it would take less time to tune my table saw so that a hollow-ground planer blade wouldn't burn cut surfaces than it does to remove the burn marks afterwards. I suspect that I'm not using my shop time as wisely as I might. But there is a trade-off here. To achieve the overall time savings, I would have resigned myself to several hours of frustrating, knuckle-busting power-tool maintenance, and the truth is that I would rather spend my time scraping and sanding.

MATERIALS LIST

A	Front and back	2 pcs.	7/16 × 6¼ × 9
B	End	2 pcs.	7/16 × 6¼ × 6⅛
C	Bottom and top	2 pcs.	9/16 × 5½ × 8⅜
D	Pull	1 pc.	⅛ × 2 × 1
E	Hinges	2 pcs.	1½ × ⅞
F	Box lock	1 pc.	1½ × 1

*These are net measurements. A surplus should be added to dovetailed parts to allow joints to be sanded flush.
*Hinges and lock were ordered from Constantine's Hardware.

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Chippendale Mirror

Cherry, Walnut

MAKING THE CHIPPENDALE MIRROR

Although not a reproduction of any specific eighteenth-century original, this mirror does evoke a number of Chippendale designs.

Begin construction with the scrollwork background. After the pieces have been band sawn and sanded, assemble them with butt joints and hold in place with a pair of cleats which are glued and screwed across the back of the scrollwork. At that time, take measurements for the large moulding which lifts and presents the glass.

This close-up shows how the scrollwork, tack strip and cleat are assembled.

Working with these measurements and the available shaper cutters and router bits, you can determine the moulding's profile. After the stock has been run, miter the four pieces of the moulded frame to length and screw into place. Complete finishing before installing the mirror to avoid sullying its surface. Tack four wood strips to the back, inside face of the moulding, to hold it in place.

MATERIALS LIST

A	Vertical scrollwork	2 pcs.	½ × 2¼ × 24¼
B	Top scrollwork	1 pc.	½ × 6⅞ × 14⅛
C	Bottom scrollwork	1 pc.	½ × 4¾ × 14⅛
D	Horizontal moulding	2 pcs.	1¼ × 1¼ × 14⅞
E	Vertical moulding	2 pcs.	1¼ × 1¼ × 19½
F	Cleat	2 pcs.	5/16 × 1½ × 16⅛
G	Vertical tack strip	2 pcs.	¼ × ½ × 17 9/16
H	Horizontal tack strip	2 pcs.	¼ × ½ × 12⅞
I	Mirror back	1 pc.	⅛ × 12⅞ × 17 9/16
J	Mirror	1 pc.	Exact measurements should be taken after the frame has been constructed.

CHIPPENDALE

What are the characteristics of Chippendale furniture?

In the strictest sense, the only furniture that can be identified as Chippendale is that to which Thomas Chippendale, the English carver and designer actually applied his tools. But there are few such pieces and many that are commonly (and usefully) referred to as Chippendale.

Another approach reserves the Chippendale name for those pieces that are exact representations of his published drawings. But this, too, is very limiting, particularly when discussing furniture made in North America. While there are a handful of American-made pieces which accurately represent specific Chippendale designs, the overwhelming majority of American-made Chippendale furniture does not—for some very good reasons.

Thomas Chippendale, George Hepplewhite and Thomas Sheraton—the English designers whose seminal books inspired much American period furniture—all designed for a different market than that served by most American craftsmen of the day. Many of the English designs were intended for placement in grand English homes and included, therefore, elaborate ornamentation that was inappropriate for less palatial American settings (and perhaps for less effete American sensibilities).

This doesn't mean that discriminating American buyers weren't concerned about the appearance of their furniture. Clearly they were, but what those buyers wanted was furniture that not only looked good but was also, and most importantly, useful. They wanted storage, serving surfaces, beds. In short, they wanted furniture in which function and form were more fully integrated.

To address this desire on the part of their customers, American designers/craftsmen reinterpreted the forms presented in the books of the English designers, restraining the decorative excesses of the originals, focusing on the usefulness of their furniture in the homes of their customers.

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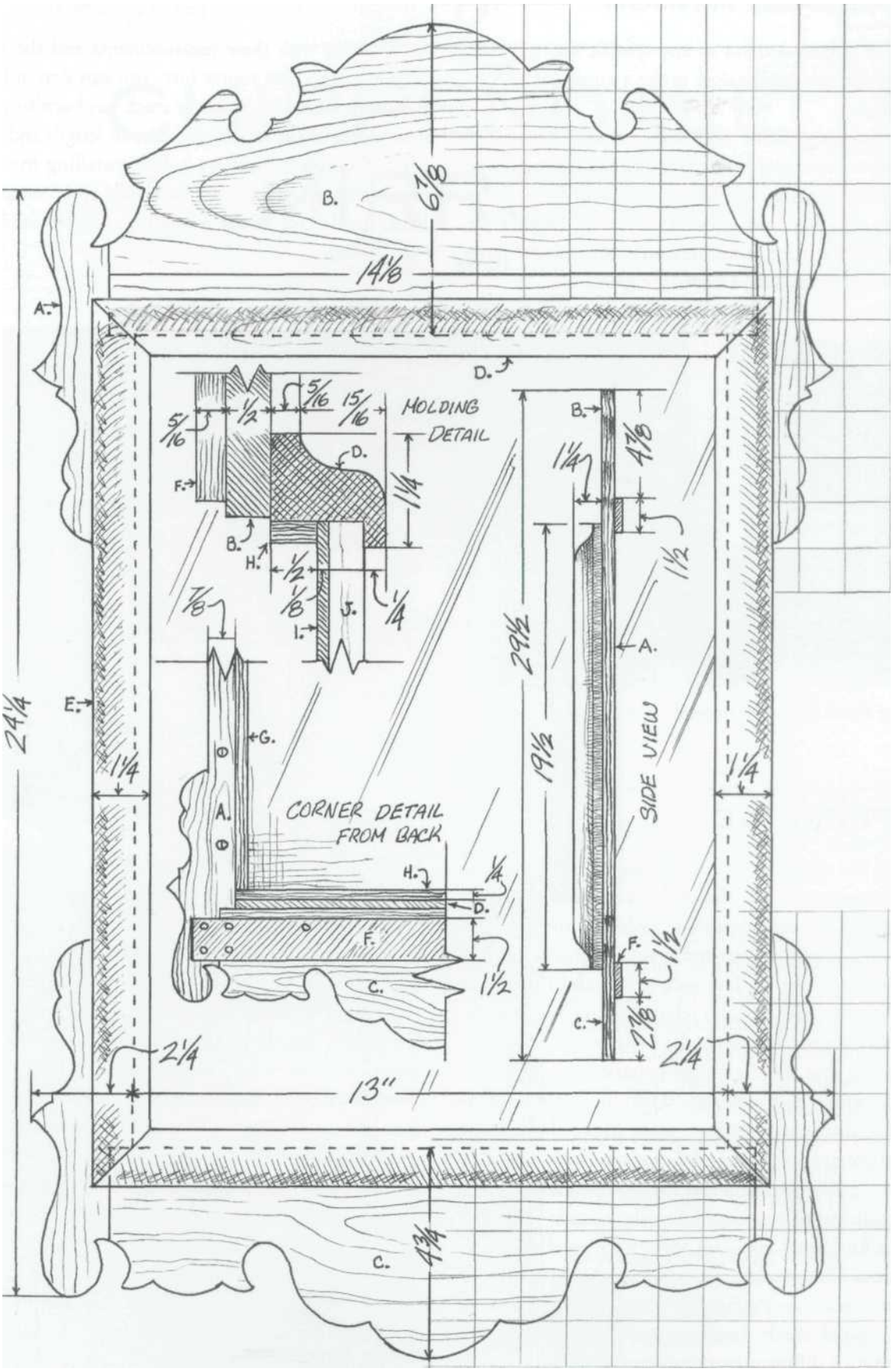

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This makes stylistic attribution a slippery business. Even though almost all high-style American furniture of the late eighteenth and early nineteenth centuries exhibits characteristics of Chippendale, Hepplewhite and Sheraton designs, very little actually represents any specific published drawings. Further complicating the business of stylistic attribution is the fact that many pieces exhibit characteristics of more than one style. A sideboard might have a spade foot (a Hepplewhite signature) and a gallery of turned spindles (associated with Sheraton's designs). A chair might have a balloon back and solid splat (Queen Anne) and ball-and-claw feet (Chippendale).

In the hands of a skilled craftsman, such blending is unimportant. A well-designed chair is a well-designed chair whatever the origins of its iconography.

But for the student of furniture, it can be useful to look at this matter of stylistic attribution—not to fasten a particular label on a particular piece but in order to reflect on the American designer/craftsman's handling of the forms and motifs with which he worked.

With that in mind, I put together the following chart:

STYLE CHARACTERISTICS

This chart is not intended to list all the elements of any of these styles. It is meant only to illustrate ways in which one style might be differentiated from another.

	CHIPPENDALE	HEPPLEWHITE	SHERATON	EMPIRE
form	syma curve	geometrical curvilinear	geometrical rectilinear delicate	massive
ornament	carving scrollwork	stringing veneering inlay	turning bandings carving reeding	carving veneering ormolu
motif	cabriole leg ball-and-claw foot	spade foot tapered legs	turned and tapered legs	animal feet animal heads

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14

SHAKER-STYLE PEDESTAL STAND

Cherry, Walnut, White Pine

MAKING THE SHAKER STYLE TWO DRAWER PEDESTAL STAND

After the stock has been dimensioned, glue-up the top panel and set aside to cure. The pedestal is turned next.

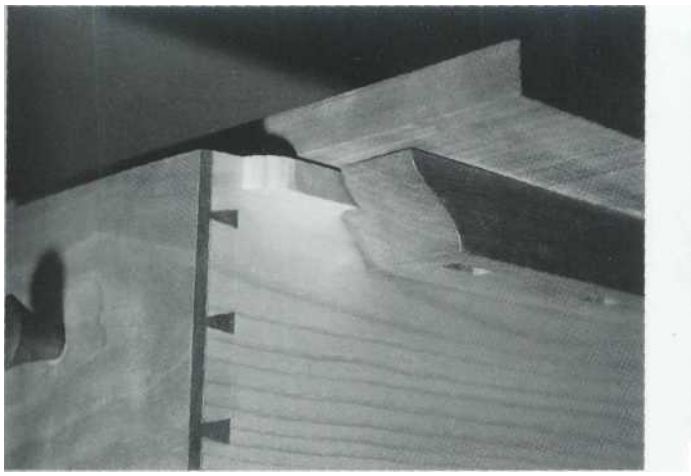
Although the arrangement of coves, beads and vases will be determined by the craftsman's individual tastes, there are two areas along the length of the pedestal that must be shaped to meet the requirements of joinery.

The first of these is the very top section, the one that will eventually become the tenon fitting into a mortise cut into the center cleat. In order to create at this location a joint that would lock more positively than would a round tenon in a round mortise, I decided to cut that tenon into a l"X 1" square. This meant that the diameter of that top section could be turned to no less than 1 7/16″.

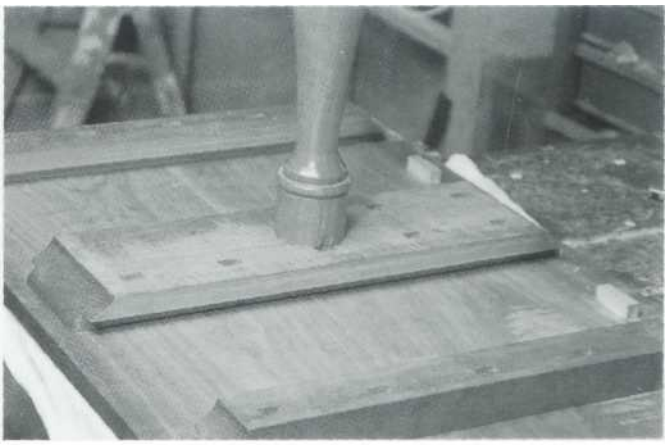
The second area requiring special attention is the base into which the tenons (or sliding dovetails) are fit. The exact diameter of this section is, of course, up to the discretion of the individual craftsman, but it is very important that a consistent diameter be maintained along the full 5 1/4"

The walnut drawer pulls contrast nicely with the cherry drawer fronts.

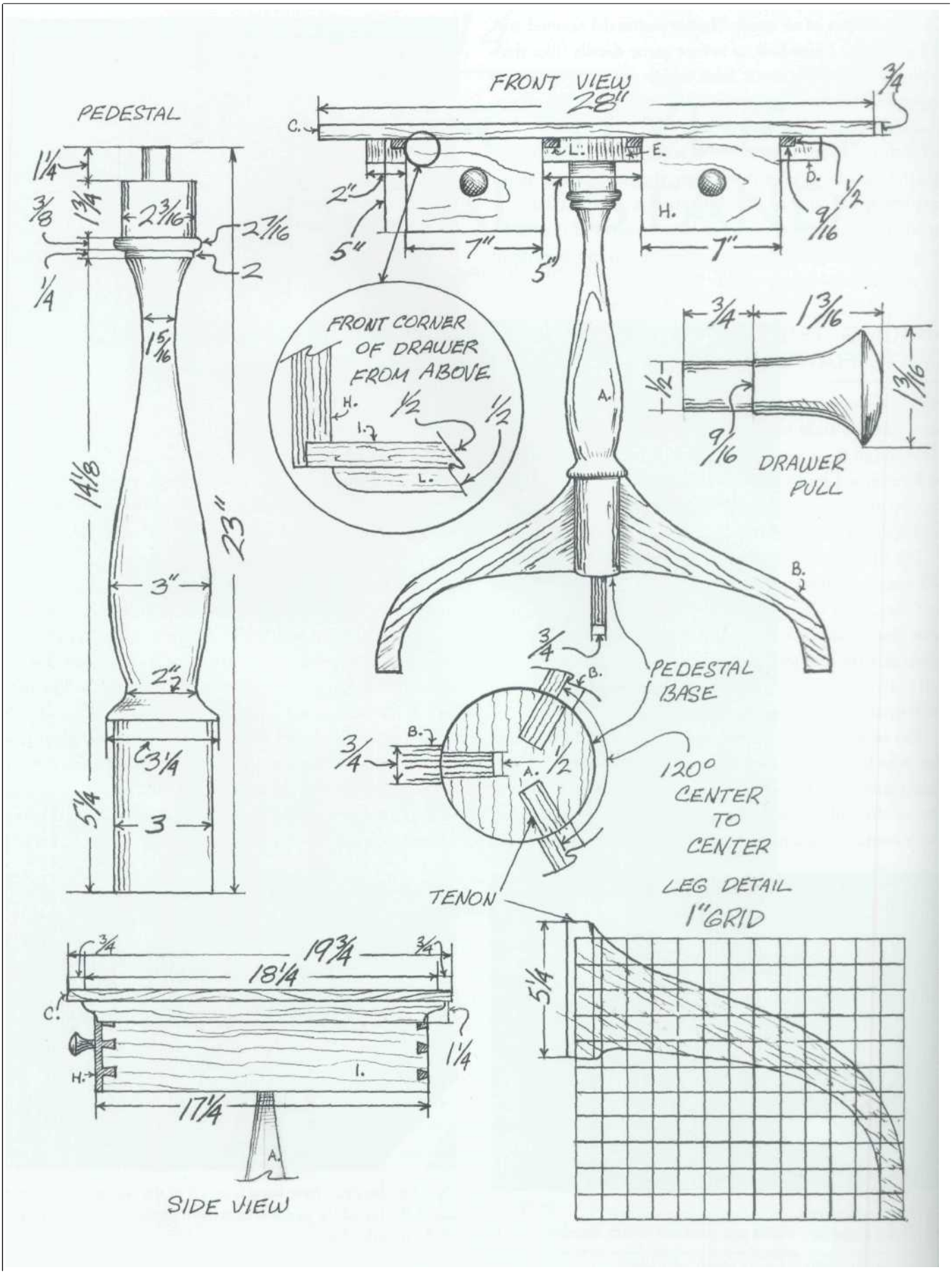
length of this section because the shoulders of the three legs will be fit tightly against this turned face, and any variation in diameter will result in gaps at those shoulders. The next step, which is taken before the work is removed from the lathe, is marking leg locations on the base of the pedestal. This can be done by using the lathe's indexing head. Briefly, an indexing head is a disk centered on the lathe's axis that is divided into thirty-six sections, each representing 10° of the disk's circumference. On my lathe, there is a spring-loaded peg that can be set into any of thirty-six holes marking these divisions. To locate the centerline of the first leg, I release the peg into any of the holes, locking the work into that position. Then, with the tool rest snugged against the base of the pedestal, I draw a line along the 5 1/4" base. This line marks the centerline of the first leg. To find the second line, I remove the peg, rotate the work, allowing the peg to slide into the next



1 Here, a drawer runner can be seen sliding into its rabbet.



2 After the cleats have been fastened to the top, glue the tenon at the top of the pedestal into the mortise cut into the center of the middle cleat.



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hole. This process is repeated until I have worked my way to the twelfth hole. Here, I draw another line along the tool rest, marking the centerline of the second leg. Then, counting out twelve more stops on the indexing head, I arrive a: the centerline for the third leg.

Although the indexing head simplifies the process of dividing the circumference of the pedestal base into three equal sections, there is an alternative requiring only a compass, a pair of calipers and a rule. First, with the calipers and a rule, determine the diameter of the base. Then, multiply half of that diameter by 1.732. Separate the points of the compass by this distance, and position the stationary leg of the compass at any point on the cylinder's circumference. Make a line along the tool rest at that point. Then, make a second line at the point at which the opposite leg of the compass is farthest from the first line. Then advance the compass so that its stationary leg rests on this second line. Finally, draw a third line along the tool rest where the opposite leg of the compass is farthest from the second line, completing the process of dividing the circumference of this cylinder into three equal sections.

Fit the three legs of this stand into $5^{1/4}$" long sliding dovetails cut into the base of this pedestal. To this point, I've cut the joints on every pedestal table I've made by hand, and it is inevitably a laborious process. To cut the dovetail mortise, I place the pedestal between 1 "-thick blocks of Styrofoam held in place by a towel wrapped in tape, securing the entire, awkward assembly in my vise. This method works but it is slow and a bit clumsy.

The dovetail tenons are even more difficult to cut. I begin these by scoring lines which mark the shoulders on the faces of the 3/4"-thick legs. Then, crowding the teeth of a fine-toothed backsaw against the waste side of this line, I cut the shoulders. Complicating this process even further is the fact that the shoulders have to be undercut so that they form a sharp knife-like edge. This is necessary so the shoulders make tight contact with the round base. Maintaining an accurate alignment along the full 5 1/4" length of these shoulders is very tricky, but not as tricky as cutting the face of the dovetail. This cut begins on the end grain of the leg and, like the shoulder, was a full 5 1/4" long. The saw delights in wandering to one side.

After having made several of these stands with hand-cut sliding dovetails, I'm ready to suggest some alternatives. First, if I were to make another with the dovetail joints, I would take the time to build a fixture that would allow the dovetail mortises to be cut with a router while the pedestal is still mounted on the lathe. A reeding or fluting fixture would work nicely for this purpose. The tenons, of course, could be readily cut on a table-mounted router.

But I really believe that, if I were to make another of these stands, I would drop the dovetail joints and switch to mortise-and-tenon construction. Not only would this be much easier to cut, it would, I think, result in no loss of strength since it would provide an equal amount of glue surface and, at least in this particular application, there is little mechanical advantage to the dovetail joint

MATERIALS LIST

Table			
A	Pedestal	1 pc.	3¼×23
B	Leg	4 pcs.	¾×5¼×18
C	Top	1 pc.	¾×19¾×28
D	Outside cleat	2 pcs.	1¼×2×18¼
E	Middle cleat	1 pc.	1¼×5×18¼
F	Drawer stop	2 pcs.	½×½×¾
G	Screws	various	
Drawers			
H	Front	2 pcs.	¾×5×7
I	Side	4 pcs.	½×5×17¼
J	Back	2 pcs.	½×5×7
K	Bottom	2 pcs.	½×4½×17
L	Runner	4 pcs.	½×½×15¾
M	Pull	2 pcs.	1 3/16×1 5/16
N	Screws	various	

**These are net measurements. A surplus should be added to dovetailed parts to allow them to be sanded flush.*

After profiling the legs on the band saw and fitting their tenons into the mortises cut into the pedestal, flatten and smooth the tabletop (see chapter five) and cut to its final length and width. Then, profile the ends of the cleats on the band saw, and cut rabbets for the drawer runners.

Using a backsaw, cut the tenon at the top of the pedestal to its 1"X 1" final size. Cut a matching mortise into the center of the middle cleat. Dry-fit this to the tenon.

At this point, fasten cleats to the bottom of the tabletop using no. 12 wood screws passing through oversized holes (holes that will allow the top to expand and contract in response to seasonal changes in humidity) in the cleats.

Build the drawers with through dovetails at the back and half-blind dovetails at the front. Screw drawer runners to the tops of the drawer sides and fit them to the rabbets in which they will slide. Turn and install pulls. Fasten drawer stops (two blocks of wood screwed to the underside of the top) into place. The piece is ready to finish.

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WALL BOX

Hard Maple

MAKING THE WALL BOX

After the material has been dimensioned, lay out the scroll-work on the back. Once the location of the top circle is established but before the scrollwork is cut out on the band saw, cut a dado across the grain on the back side of this circle. This dado should extend well below the narrow throat on which the top circle is resting. Fit a strip of vertically grained wood into that dado and fasten with 3/8″ no. 4 wood screws. Then, cut out the scrollwork.

After establishing the angle for the two sides, cut the top edge of the front to match. You can do this on the table saw by ripping the piece to width on a blade canted at the proper angle, but I find it quicker to create that angle with a few strokes of a hand plane. Use a bevel gauge to check progress during this operation.

Remember that the angle on the box's front piece is not cut to match the height of the sides at their front most point because the highest point of the angle on the front piece will join the sides 7/16" back from the frontmost point. The 7/16" measurement allows 3/8″ for the thickness of the dovetail joint, plus a 1/16" surplus which will be sanded away to make the joint flush.

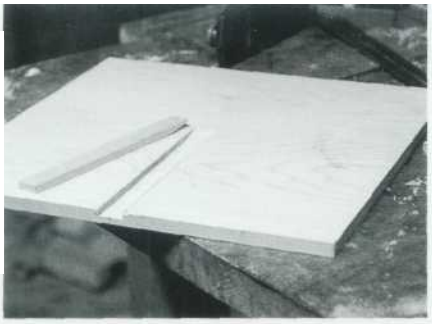
Cut the dovetails at each of the box's corners. After sanding these flush, give the bottom of the box and the lid shaped edges on a shaper or a table-mounted router. Install the bottom with wood screws passing through over-sized holes in the bottom. These holes are oversized to allow the part to expand and contract in response to seasonal changes in humidity.

The narrow top, to which the lid will be hinged, is the next consideration. Form the angled front edge, which will abut the angled back edge of the lid, with a hand plane. Then fasten it to the case with several screws passing through the back of the box. Although 1 felt it unnecessary because of the top's narrow width, this part might be more securely fastened by installing some short glue blocks underneath the joint between the top and the sides of the case.

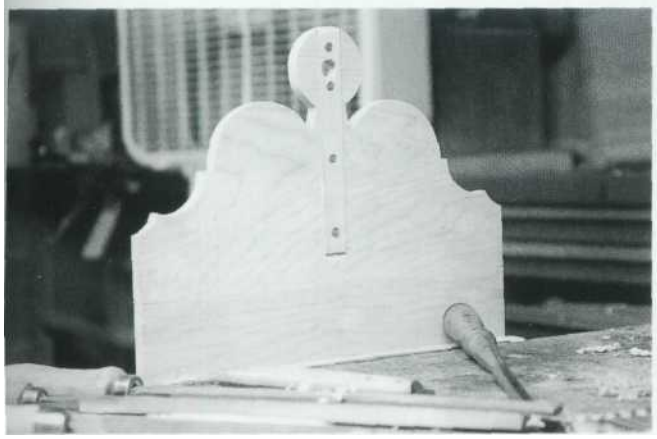
Using a hand plane, fit the back edge of the lid to the angle already established on the front edge of the box's top. Do this gradually so that it can be fit against the front edge of the top without gapping at the ends.

Next, install the hinges. The pair shown in the photo are Brainerd antique brass hinges from which the tails on the upper leaves have been cut to allow those upper leaves to fit on the narrow width of the top of the box.

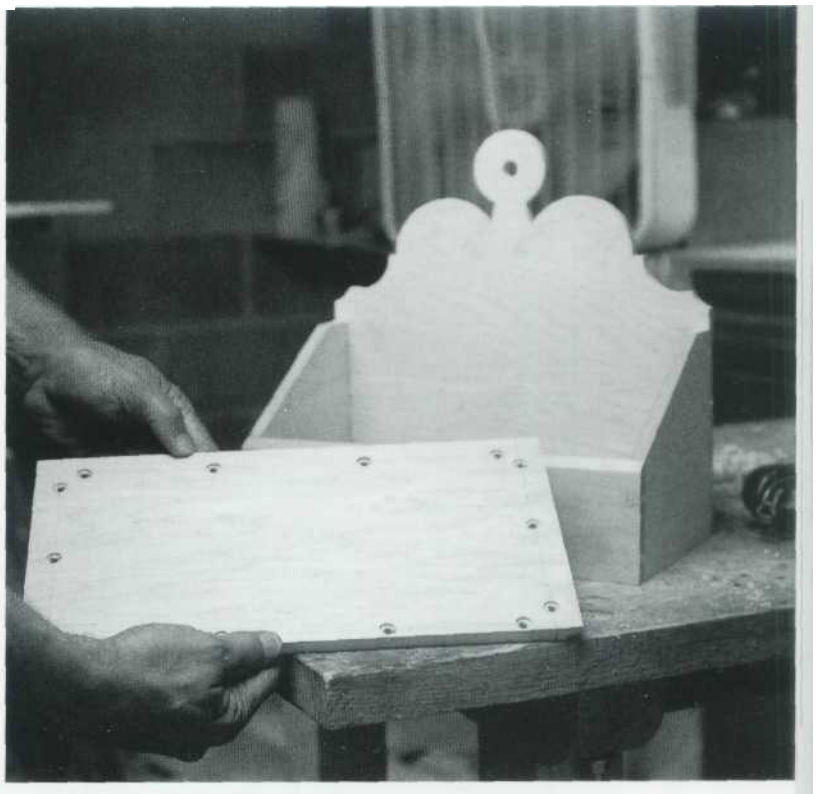
Remove the hinges and give the box a final sanding and several coats of finish.



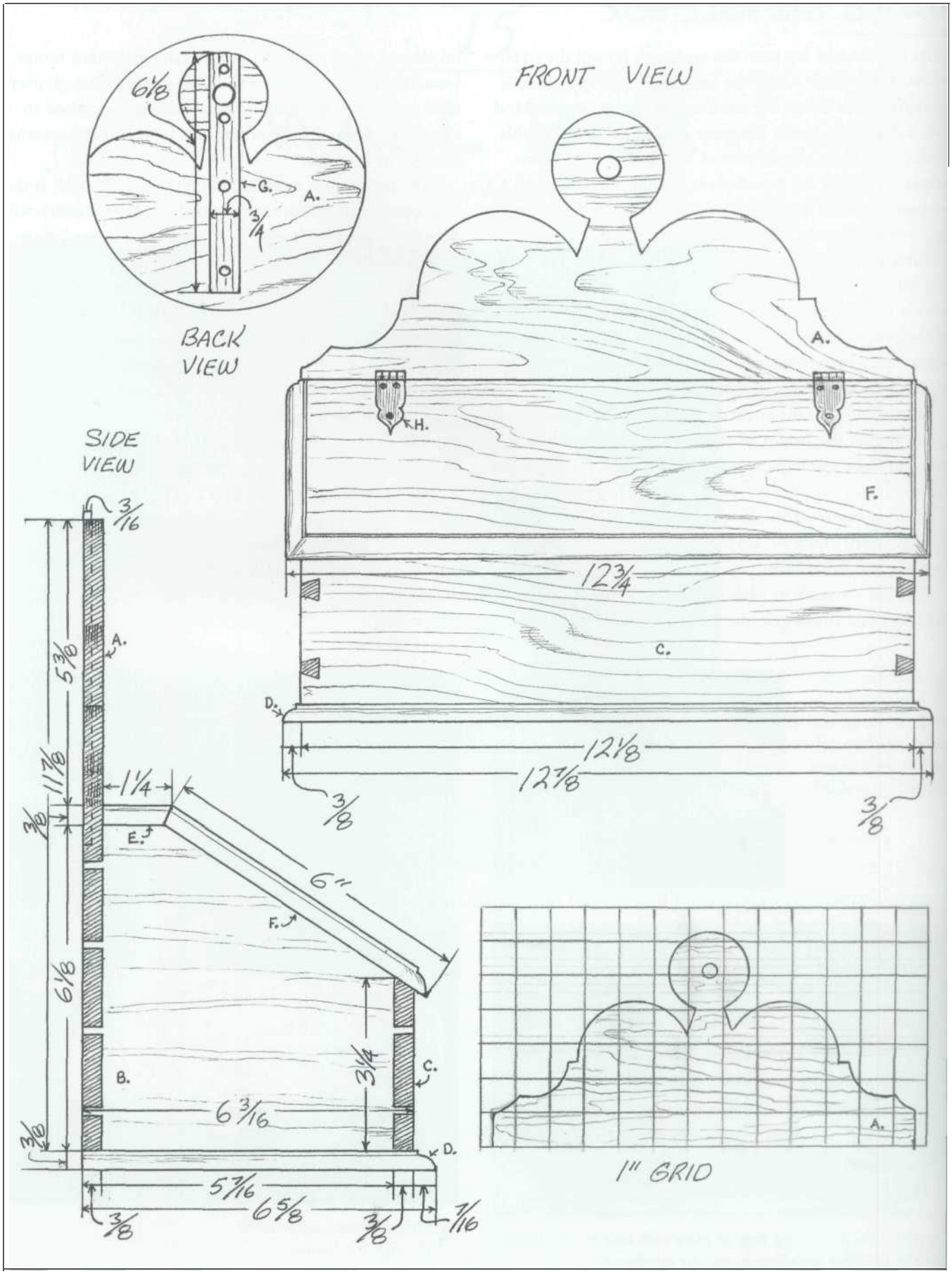
1 Butt this wide, straight edge up to the fence on the radial arm saw and | cut the dado before the back is profiled.



2 Hold the reinforcing strip in place with four 3/8" no. 4 wood screws. After installing it, cut the scrollwork.



3 Drill oversized screw holes through the bottom.


FRONT VIEW
6 1/8
G.
A.
3/4
BACK VIEW
A.
H.
F.
12 3/4
C.
D.
12 1/8
12 7/8
3/8
3/8
SIDE VIEW
3/16
5 3/8
A.
11 7/8
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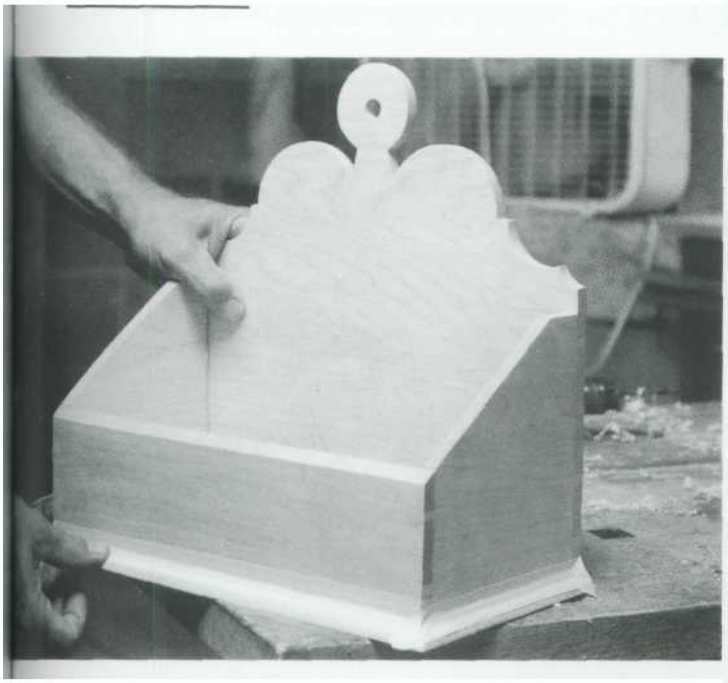


4 Hold the bottom in place with masking tape while driving the screws up into the box's frame.

5 With the box held upside down in a vise, fasten the bottom.

6 Check frequently to ensure that the top and the lid will come together without gaps.

MATERIALS LIST

A	Back	1 pc.	⅜ × 11⅞ × 12⅛
B	Side	2 pcs.	⅜ × 6⅛ × 6³⁄₁₆
C	Front	1 pc.	⅜ × 3¼ × 12⅛
D	Bottom	1 pc.	⅜ × 6⅝ × 12⅞
E	Top	1 pc.	⅜ × 1¼ × 12¾
F	Lid	1 pc.	⅜ × 6 × 12¾
G	Reinforcing strip	1 pc.	³⁄₁₆ × ¾ × 6⅛
H	Hinge	2 pc.	3¼ × ½
I	Screws	14 pcs.	¾″ no. 6

**These are net measurements. A surplus should be added to dovetailed parts to allow them to be sanded flush.*

Hepplewhite Style

Cherry, Birch, White Pine

MAKING THE HEPPLEWHITE" STYLE END TABLE

Select plane, joint and edge-glue material for the top.

Set aside the top panel, and prepare the legs. First, dimension the leg stock to 15/16″ *X 15/16".* Then mark and cut the mortises for the apron parts and the drawer rails, and draw the taper on the leg stock with a pencil.

On the face of the leg that will be seen from the side of the table, the legs taper from ^{15}/i6" at the lower limit of the apron to 1/2″ at the floor. On the face of the legs that will be seen from the ends of the table, the legs taper from *5/16" to 3/8"*

Cut the tapers on the band saw; clamp the leg in a vise so that saw marks can be removed with a hand plane.

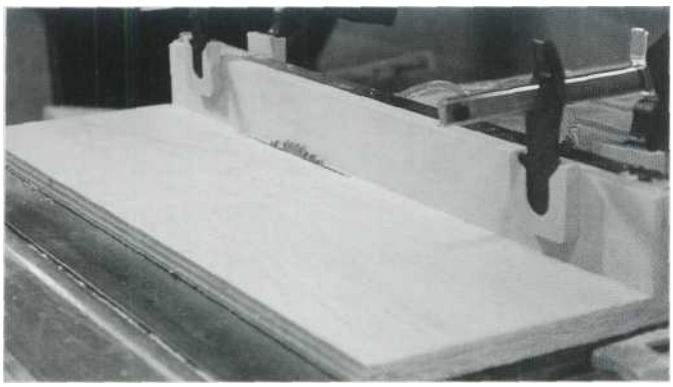
Cut out and tenon apron parts and drawer rails. Fit these tenons into the leg mortises which are placed so that the outside faces of the apron parts are recessed 1/8″ from the outside faces of the legs. Set the drawer rails, on the other hand, so that their outside faces are flush with the outside faces of the legs. Then, glue-up the frame—consisting of the apron parts, the drawer rails and the legs.

Remove the tabletop from the clamps, and surface' it with hand planes and sandpaper, a process discussed in chapter five.

Next, cut the grooves for the inlay. You could make these with a router, but I cut the grooves on this top on a table saw fit with a hollow-ground planer blade. This blade is made without set and with a thin-ground rim. As a result, it leaves a 3/32" saw kerf with sharp, clean edges.

Rip out the birch inlay itself using the same planer blade passing through a combination wood fence and throat that is clamped to the saw's steel fence. Glue the inlay into its grooves; plane and sand flat.

Because the top will expand and contract across its width in response to seasonal changes in humidity, fasten it to the table frame with wood screws passing through oversized holes in the kicker strips. (The kicker strips are the two cleats above the drawer sides that keep the front of the drawer from dropping as the drawer is opened.) The over-sized holes in the kicker strips will allow wood movement without splitting the top.



Shown here is the combination fence and throat I use for ripping inlay and cock bead.

This close-up of the drawer side shows the cock bead inlay around the drawer.

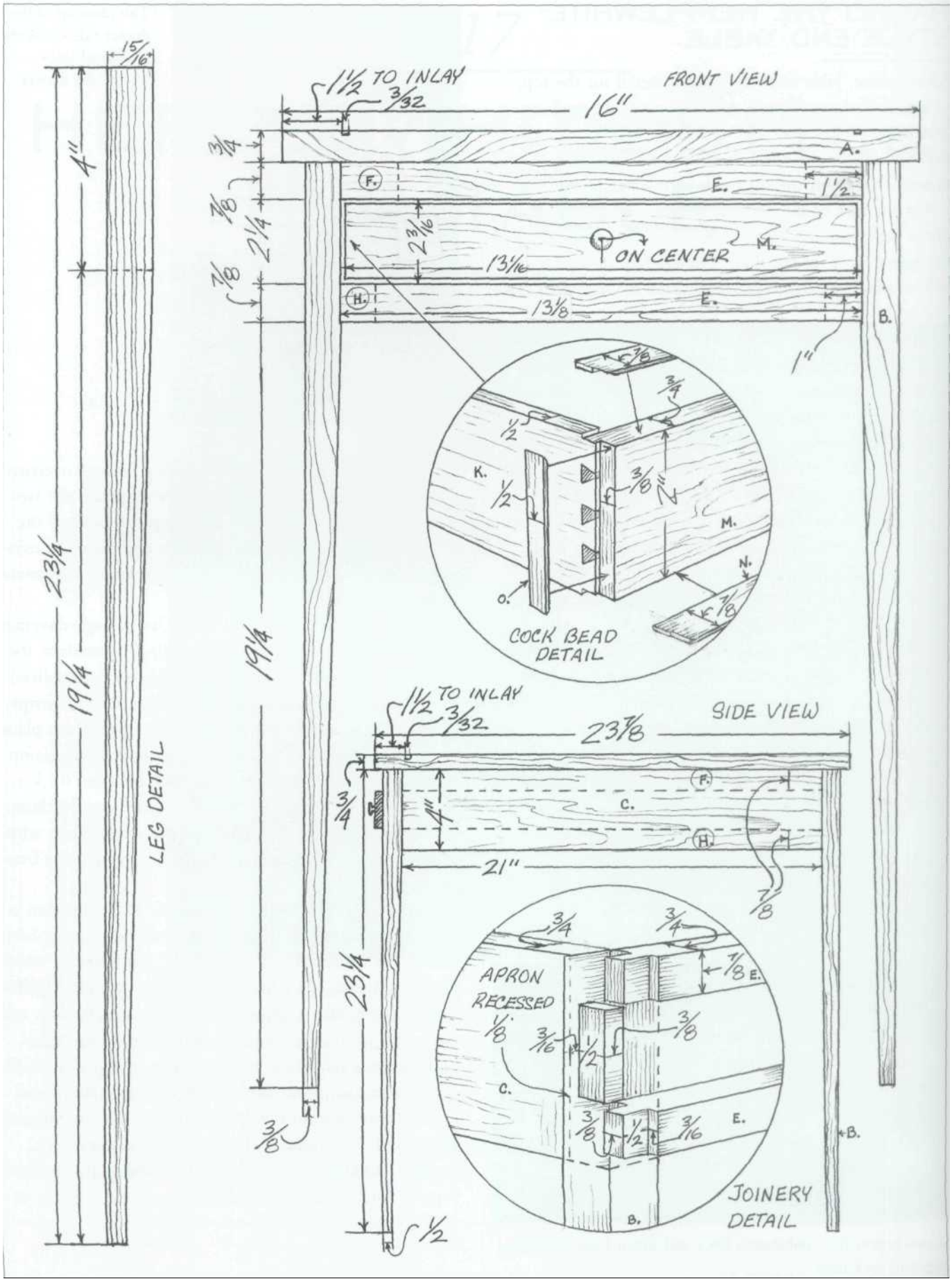
Drawer construction is standard. Use through dovetails at the back of the drawer and half-blind dovetails at the front. (Both joints are discussed in chapter twenty-five.)

Rip strips for the ^{3}/32" cock bead (thin, mitered strips framing the drawer front) from $^{7/8}$" birch stock. Next, plane them. To round the front edge of the cock bead, clamp the strips of *3/32"* planed stock in a vise between thicker, wider boards so that approximately 1/4" sits above the clamping boards along the full length of the strips. Then with a block plane, remove enough material to round the front edges of the strips.

Next cut rabbets for the cock bead. This operation is done on the table saw, again using a hollow-ground planer blade. The blade is set to a height 1/8″ less than the width of the cock bead (5/8")• Then, with the blade crowded against a wood fence, take a single pass from the top, bottom and both ends of the drawer which stands on its front end.

This cuts a rabbet 3/32" wide which is equal to the thickness of the cock bead. With brads and glue, fasten the mitered cock bead to the drawer front so that its rounded edge stands 1/8" proud of the face of the drawer front.

After installing the drawer runners and stops, the table is ready for finishing and hardware.



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Almost 150 pages of Thomas Sheraton's *The Cabinet-Maker and Upholsterer's Drawing Book*, a collection of some of the most influential furniture designs ever published, is focused on geometry, including almost thirty pages on the five classical orders of proportion taken from the five types of Roman columns: Tuscan, Doric, Ionic, Composite and Corinthian.

This lengthy exposition on the subjects of geometry and proportion highlights the importance of formal design education to the makers of period originals. This is an education that many modern designers/craftsmen lack. Some contemporary woodworkers, guided by enormous natural talent, seem unhindered by this absence. Others, however, lacking both the talent and the education, are creating furniture which, while well-crafted, is often clumsy in appearance.

Although not guided by either an enormous natural talent or by a classical design education, I've found that, in order to do business, it has been necessary for me to design work to suit my customer's needs. What follows is a list of commonsense principles I've found useful:

1. *Steal from the past.* Wood furniture has a history that stretches back at least five thousand years, and throughout that span designers and craftsmen have struggled with the same question confronting wood workers today: How can chairs, beds, tables and chests be designed so that they are both beautiful and useful?

Clearly, no single answer to this question is perfect. If it were, we would have only one style of bed, chair or table. But many of the hard-won solutions created by our predecessors are worthy of study and emulation.

2. ***Take chances.*** Particularly at the pencil and paper stage, the most bizarre ideas deserve consideration be cause, although they may never be translated whole into actual pieces of furniture, a careful examination may reveal things that can be incorporated into more tradi tional forms.

3. ***Consider aesthetics and joinery simultaneously.*** Often, designs that look spectacular on paper simply can't be created from wood, a natural material with a whole range of characteristics that must be considered each time one wood part is joined to another.

4. ***Develop graceful lines.*** When I designed the two-drawer sewing stand (after several Shaker originals), I worked to create a curve in the legs that would move smoothly into the curves of the pedestal. I hoped this would lift the eye to the tabletop and drawers, as well as produce a line that was inherently satisfying to contemplate.

5. ***Repeat motifs.*** Repetition of a shape, pattern or color can give a piece both rhythm and unity. On the six-drawer chest, for example, the cone shape of the pulls is repeated six times across the front of the drawers, adding visual rhythm in much the same way that a repeated drumbeat can add auditory rhythm to a piece of music. Also, that tapered cone shape is repeated in the four legs that support the chest, assuring the viewer that all these parts belong to the same piece.

6. *Incorporate exposed joinery.* *A* set of dovetails marching across the corner of a piece not only adds rhythm (see photo on page 26), it also adds an appealing

MATERIALS LIST

Table		
A Top	1 pc.	¾ × 16 × 23⅞
B Leg	4 pcs.	1⅝ × 1⅝ × 23¼
C Apron side	2 pcs.	¾ × 4 × 22[1]
D Apron end	1 pc.	¾ × 4 × 14⅛[1]
E Drawer rail	2 pcs.	⅞ × ¾ × 14⅛[1]
F Kicker strip	2 pcs.	⅞ × 1½ × 21
G Cleat	1 pc.	⅞ × 1½ × 10
H Drawer runner	2 pcs.	⅞ × 1 × 21
I Inlay		3/32 × 3/32 × 7 linear feet
Drawer		
J Bottom	1 pc.	½ × 12⅝ × 15¾
K Side	2 pcs.	½ × 2 3/16 × 16⅛
L End	1 pc.	½ × 1⅝ × 13 1/16
M Front	1 pc.	¾ × 2 3/16 × 13 1/16
N Horizontal cock bead	2 pcs.	3/32 × ⅞ × 13 1/16
O Vertical cock bead	2 pcs.	3/32 × ½ × 2 3/16
P Pull	1 pc.	½ × ½

[1] *Includes ½" tenon on each end.*

**Net measurements are given. A surplus should be added to the lengths of dovetailed parts to allow them to be sanded flush.*

**Drawer height and width are 1/16" less than the height and width of drawer opening. This allows 1/32" of clearance on all four sides.*

**The pull was ordered from Constantine's Hardware.*

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visual detail, which arrests the eye, satisfying its hunger for interesting shapes and patterns.

7. *Adapt stock thickness to the scale of the piece.* Smaller, more delicate pieces require stock dimensioned to a greater thinness. A plate rack that is elegant when built from 3/8″ material is brutish and clumsy when built from $^{7}/8$" stock.

8. ***Use beautiful materials.*** Yes, hardwood—particu larly figured hardwood—is expensive, but the simplest pieces (the Shaker document chest, for example) are enormously appealing when built with beautiful material.

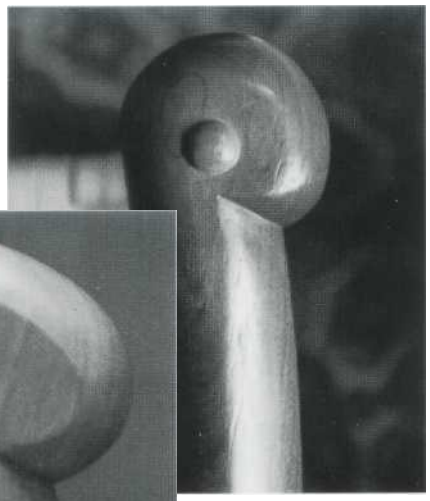
9. ***Use contrasting materials.*** A desk made entirely of walnut heartwood can be very attractive. But imagine that same desk with curly maple drawer fronts or with streaks of walnut sapwood showing like jagged lightning across the top.

10. *Recognize that design is as much an evolution ary process as a revolutionary process.* Rather than focusing on sweeping changes that might be made to the form of a chair, bed or chest, a designer might be better served by focusing on small, incremental changes which, over time, might add up to something significant.

DESIGN EVOLUTION

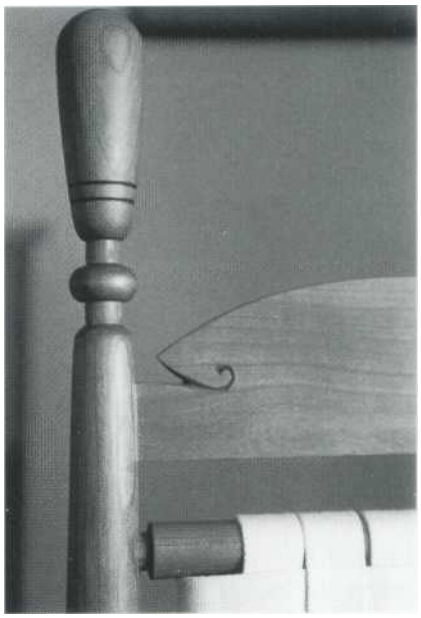
These photos illustrate the evolutionary development of an arm shape I've used on many Shaker-style chairs.

1 The first photo shows one of my earliest attempts to elaborate on the cookie-cutter shapes of the Shaker original.



3 The last two photos show details of a more recent chair.

2 The second shows an arm that's been widened and given a more distinct form.



4 The incised curve on the top of the arm now reaches to the wedged through tenon at the top of the chair's front post, a shape that recurs on the chair's slat.

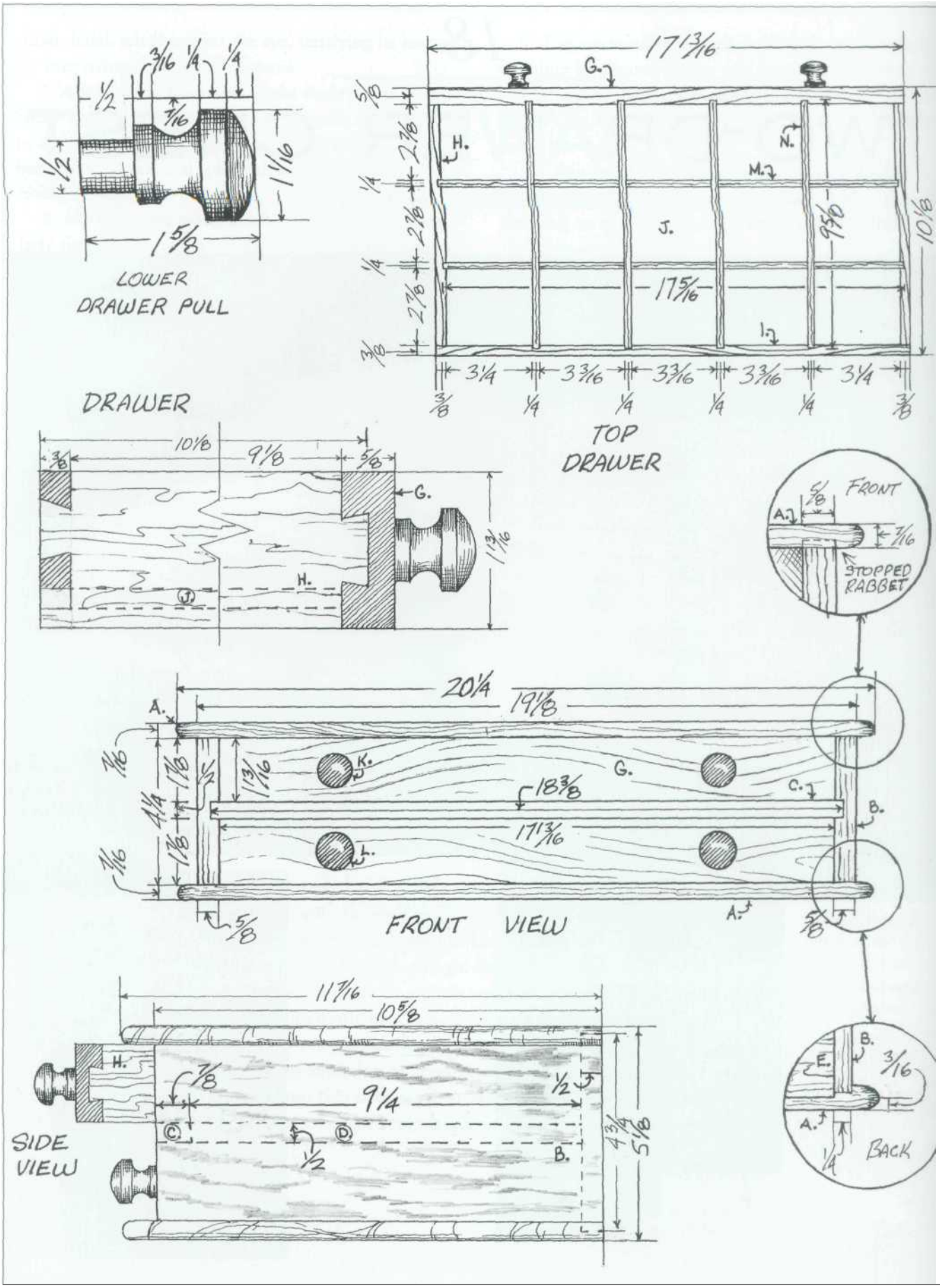
Two Drawer Chest

Curly Maple, Cherry, Beech, Poplar

18

TWO-DRAWER CHEST

Curly Maple, Cherry, Beech, Poplar



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MAKING THE TWO-DRAWER CHEST

After the material has been dimensioned, cut the joints for the case. First, cut the 1/8" X 5/8" stopped dadoes on the top and bottom that will receive the case sides. (See chapter five for information about cutting a stopped joint on the table saw.) Then cut the 5/16" X 1/2" rabbet along the back inside edges of the case sides and a 1/4" X 1/2" rabbet along the back inside edges of the top and bottom. Although the side rabbets run the length of the stock, the rabbets on the top and bottom are stopped on both ends. (Chapter five discusses a method for making stopped grooves and rabbets on the table saw.) Finally, cut the dadoes that will receive the dust panel and the drawer rail. Assemble the case with glue and screws. Fit plugs into the countersunk screw holes in the case's top.

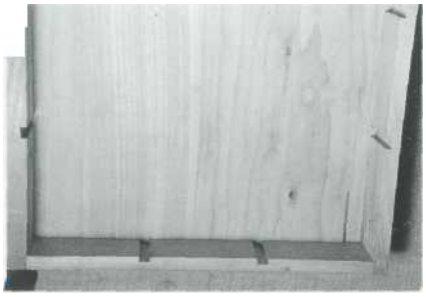
Build the drawers next. The bottom drawer is a simple box, the parts of which are joined together with a single fat dovetail at each corner, through at the back, half-blind at the front (see chapter twenty-five). The upper drawer, compartmentalized by egg crating, is a little more complex.

After the egg crate stock has been dimensioned, dado the interior faces of the drawer sides, front and back to receive the ends of the crating material. Lay out and cut the half-slots that will join the pieces of the crating material. For this particular drawer, the slots were cut on the bottom half of the short lengths and the top half of the long lengths.

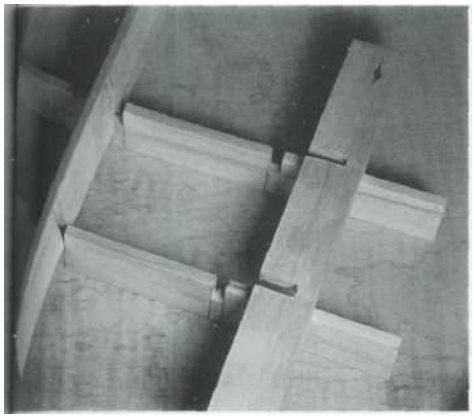
MATERIALS LIST

Case			
A	Top and bottom	1 pc.	7/16 × 11 7/16 × 20 1/4
B	Side	2 pcs.	5/8 × 4 1/2 × 10 5/8
C	Drawer rail	1 pc.	1/2 × 7/8 × 18 3/8
D	Dust panel	1 pc.	1/2 × 9 1/4 × 18 3/8
E	Back	1 pc.	1/2 × 5 × 18 3/8
F	Plug	8 pcs.	3/8 × 1/4
Drawers			
G	Front	2 pcs.	5/8 × 1 13/16 × 17 13/16
H	Side	4 pcs.	3/8 × 1 13/16 × 10 5/8
I	Back	2 pcs.	3/8 × 1 7/16 × 17 3/4
J	Bottom	2 pcs.	1/4 × 9 3/4 × 17 1/4
K	Upper pull	2 pcs.	1 × 1 1/2
L	Lower pull	2 pcs.	1 1/16 × 1 3/8
Egg crating			
M	Long	2 pcs.	1/4 × 1 3/16 × 17 5/16
N	Short	4 pcs.	1/4 × 1 13/16 × 9 5/8
Hardware			
O	Screws	various	

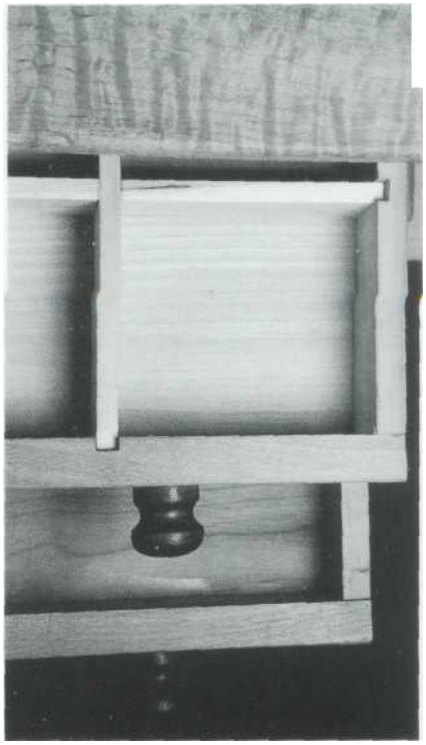
**These are net measurements. A surplus should be added to dovetailed parts to allow them to be sanded flush.*



1 Prior to the drawer's assembly, cut dadoes on the inside faces of the drawer front, back and sides.



2 The egg crate components are held together with half-slots.



3 The chest's partially open drawers are shown here from above. Note the shape of the drawer pull.

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DRYING RACK

White Ash, Walnut

MAKING THE DRYING RACK

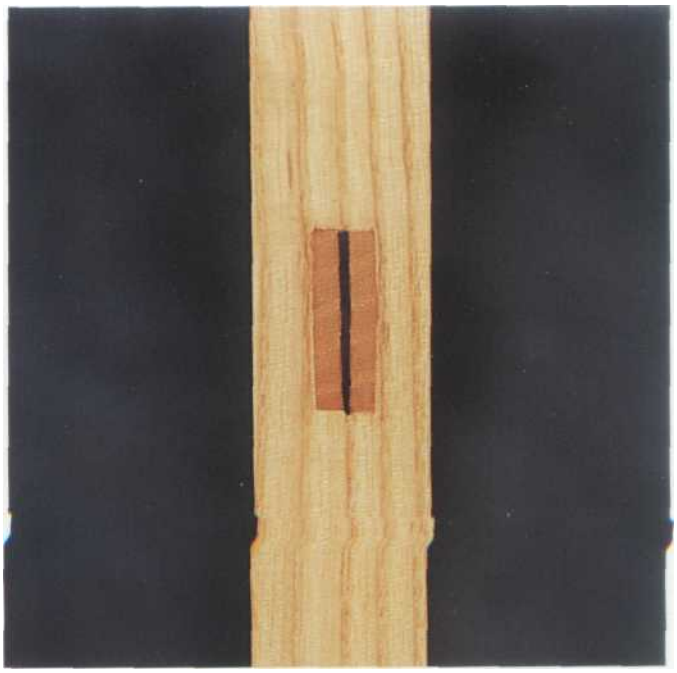
After milling the stock to the required thicknesses, widths and lengths, cut the feet with a band saw.

Form tenons on both ends of the posts and crossbars. This can be done by hand, using a tenon saw, or on a table saw fit with a stack of dado cutters.

Lay out and cut the twelve through mortises. Precision is essential with these tiny joints as the slightest error will multiply over the lengths of the posts, arms and crossbars. When test-fitting these tenons into their mortises, it's important to use a framing square (or other long-armed square) to make frequent checks of all right angles.

Notches for the walnut wedges should be no wider than *the kerf of a fine-toothed hacksaw. After cutting these* notches, dry-assemble the rack. Check angles and joints. Then, knock apart the rack, glue the joints, and drive the tiny walnut wedges into their notches.

After the glue has cured, saw off protruding wedges, pare tenons, and give the piece a final sanding.



Walnut wedges contrast with the ash through tenon and end grain.

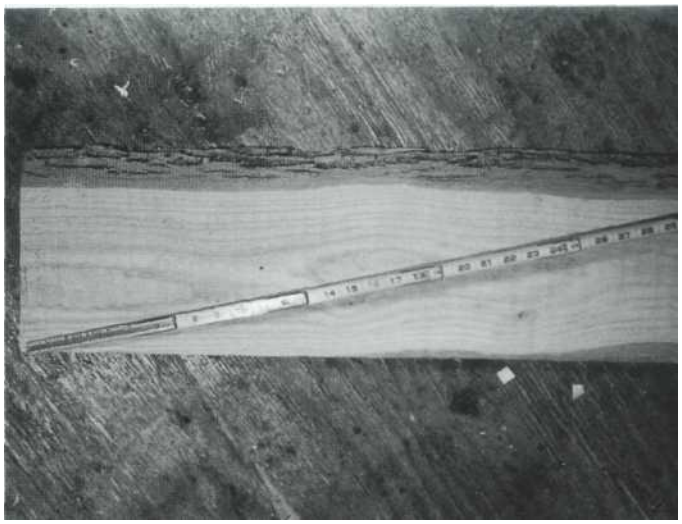
FITTING MATERIAL TO TASK

All woods are not created equal. Among our American hardwoods, some—like cherry and walnut—display striking color. Others—such as oaks, ashes and hickories—have enormous resistance to breaking. Still others—like hard maple—can be turned or carved very finely without detail crumbling away as it might with a coarser wood.

Traditionally, furniture was designed to take advantage of the different characteristics of the different species. The selection of species for the various parts of the Windsor chair illustrates this point. Windsor seats, which must be shaped to conform to the human bottom with hand tools—adzes, inshaves, travishers—were typically made of pine or poplar: softwoods relatively easy to manipulate. The legs were often turned from hard maple which, despite its non-descript color, possesses enormous strength and turns very nicely. Back spindles were usually shaved from white oak which, even when reduced to a tiny diameter, retains great resistance to breaking. This principle of matching material to task was also applied to casework. Primary woods (those used to fashion visible parts) were chosen for the beauty of their color and figure. Imported mahogany, walnut, cherry and figured maples were the traditional choices for this application. Secondary woods (those used to fashion interior components such as drawer parts) were selected for availability, the ease with which they could be worked. For this use, pine and poplar were common choices.

In general, eighteenth- and nineteenth-century woodwork reflected an intimate knowledge of the different qualities of different species of wood.

In an attempt to fit my material to my task, I chose ash for this drying rack because, of all the woods available in my shop, it offered the greatest strength when *planed so* thinly. This said, I should also point out that the original on which this rack is based was, inexplicably, built of pine.



1 The Shakers delighted in doing much with little. In this single length of ash, there is more than enough material to build two of the Shaker-designed drying racks.

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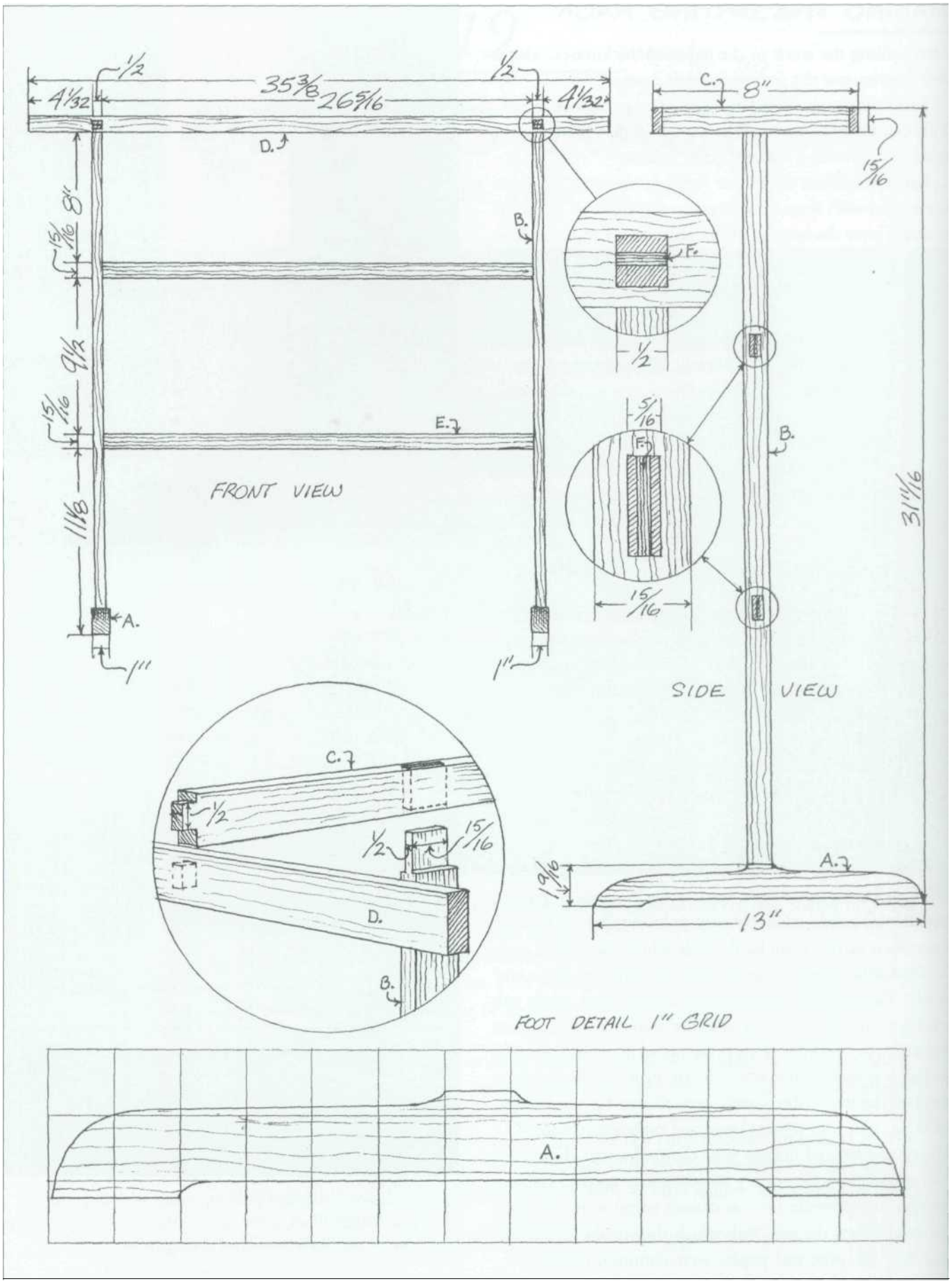

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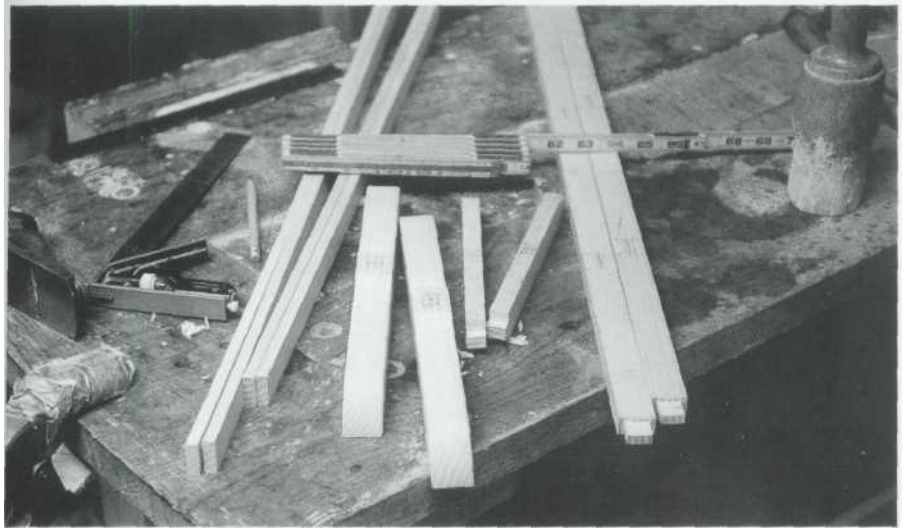
2 Tenons can be cut on the table saw with a stack of dado cutters.



3 After the parts have been dimensioned, shaped and tenoned, lay out and cut mortises.

MATERIALS LIST

A	Feet	2 pcs.	1 × 1 9/16 × 13
B	Post	2 pcs.	1/2 × 1 5/16 × 31 7/16
C	Crossbar	2 pcs.	1/2 × 1 5/16 × 8
D	Arm	2 pcs.	5/16 × 1 5/16 × 35 3/8
E	Post brace	2 pcs.	5/16 × 1 5/16 × 27 5/16
F	Wedges	8 pcs.	1/8 × various widths

**These are net measurements. Surplus should be added to the lengths to allow through tenons to be sanded flush.*

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Six Drawer Chest

Curly Maple, Walnut

MAKING THE SIX-DRAWER CHEST

After the stock for the top, bottom and ends of the case has been thicknessed, ripped to width, and cut to length, each must be given a 1/4″ X 5/16" rabbet that will later receive the back panel. At this time, cut the through dovetails at each corner. *The rabbet complicates this process, but there* are a couple of easy choices you can make here: (1) miter the materiaJ that will house the rabbet, or (2) use a Jap joint in which the rabbets on the case's top and bottom simply lap the rabbets on the ends.

After fitting the dovetails, lay out and cut the dadoes for the partitions between drawers. Then glue-up the case.

After the glue on the dovetails has cured, slide the partitions into place with a bit of glue spread in the dadoes. Drive brads through the top, sides and bottom of the case to help hold these partitions.

Fit the tenons at the top of each leg into mortises drilled into the bottom of the case, and affix the back panel in its rabbet using 1/2″ no. 6 wood screws passing through oversized holes (to allow for wood movement as the panel expands and contracts in response to seasonal changes in humidity) in the panel.

Except for the big, fat dovetail at each corner, drawer construction is conventional. Plough a 1/4" X 1/4" groove on each drawer side and on the back of the front. These will receive the 1/4"-thick drawer bottom. The back of the drawer is not as high as the sides; it extends down only as far as

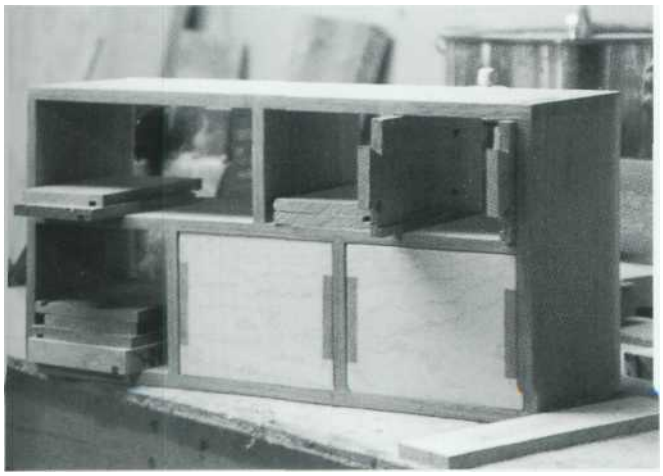
Partially open drawers reveal the fat dovetails.

the top of the drawer bottom. Nail through the drawer bottom, up into this drawer back.

For a larger, weight-carrying drawer, the single dovetail at each corner would be a poor choice, but for such a tiny drawer, one that will never carry more than a few ounces of load, the single dovetail provides a joint offering a fair amount of mechanical resistance to forward pull and a fair amount of glue surface.

Turn the drawer pulls from walnut and fasten them in place with a thin tenon fit into a mortise drilled into the drawer front.

BUILDING THE DRAWERS



Each drawer is custom-fit into its opening. First, plane the sides to the right height—one that permits them to slide into their openings with the least amount of clearance.

2 Cut dovetails using a backsaw and a coping saw. Use a parting chisel to achieve final fit.

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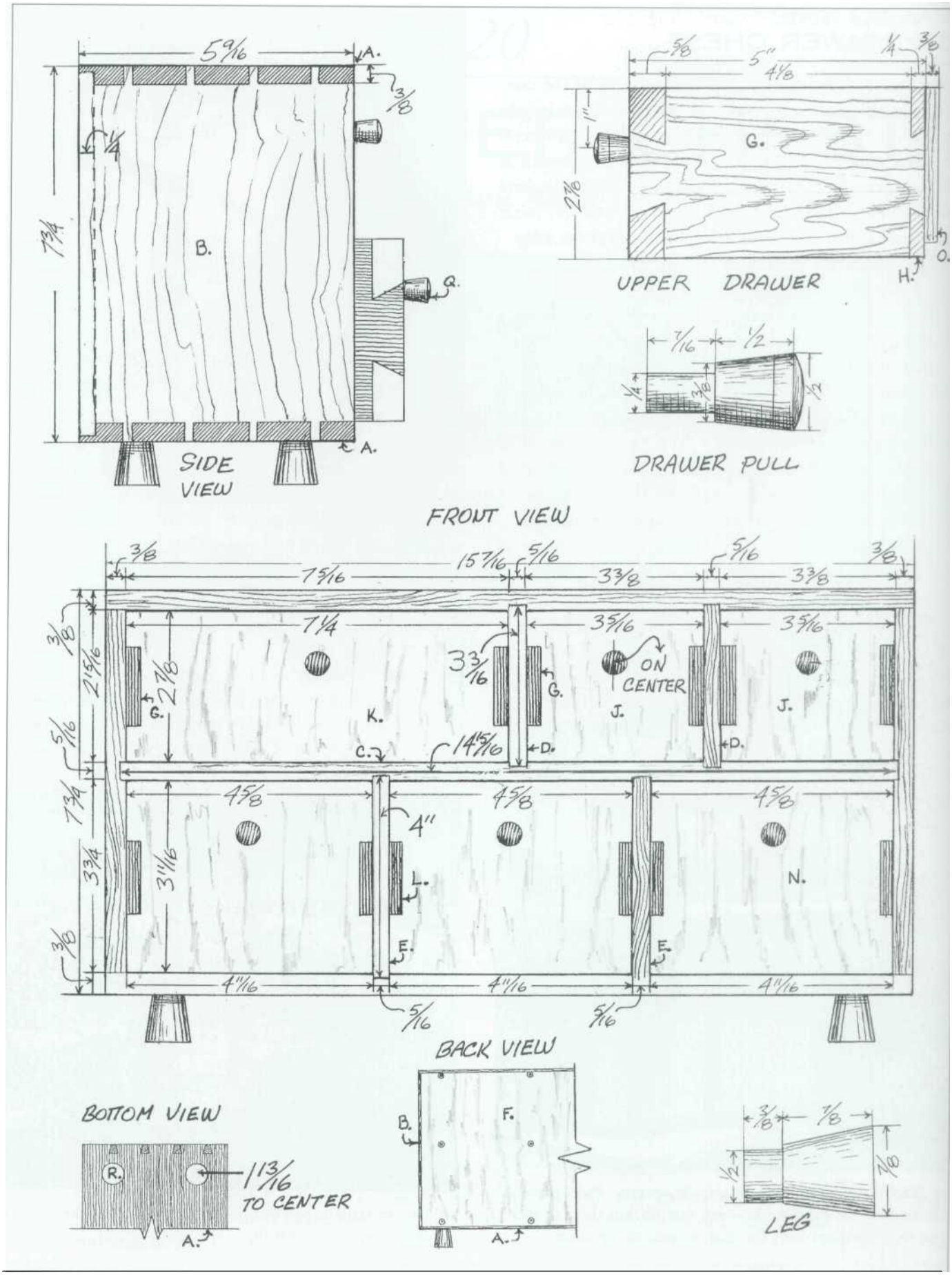

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BUILDING THE DRAWERS
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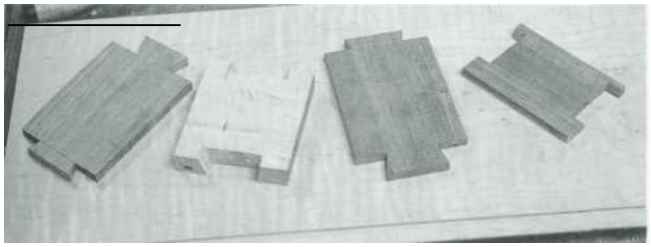
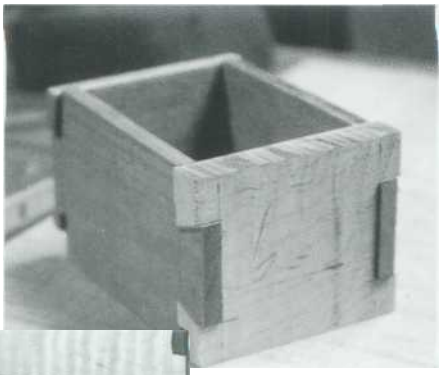
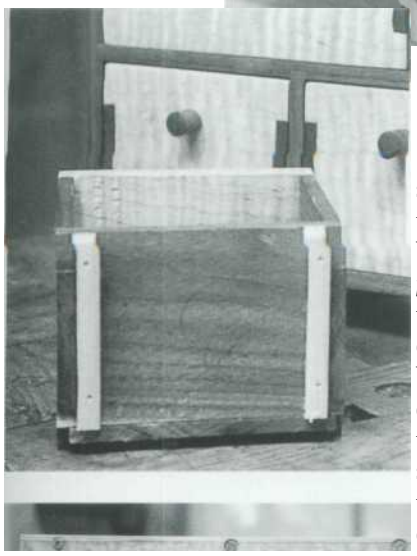


3 After its parts have been cut and fit, the drawer is ready to assemble. Brads help the glue hold the drawer sides in place.

4 Note the surplus length at each corner. This is ground off with a belt sander

.





5 After sanding the sides and the front of the drawer, slide the bottom into *place and fasten with* brads. Plug the holes at the ends of the grooves on both sides of the drawer front. Plane thickness from the two strips of softwood tacked to the back of each drawer to achieve final fit.

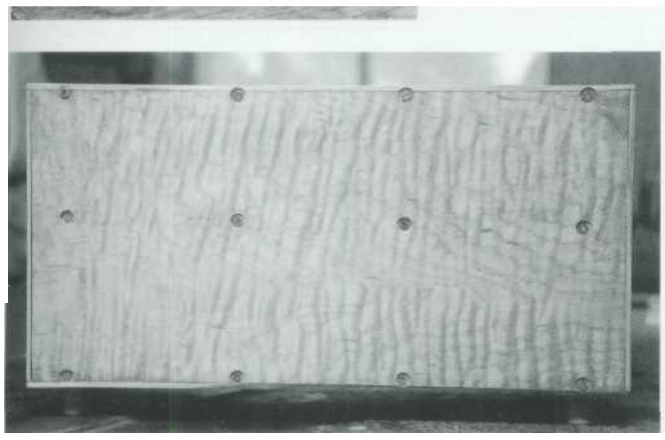
MATERIALS LIST

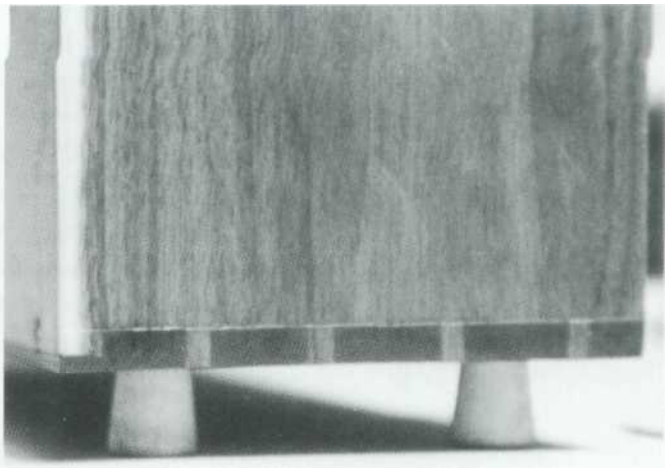
Case			
A	Top and bottom	2 pcs.	⅜ × 5 9/16 × 15 7/16
B	End	2 pcs.	⅜ × 5 9/16 × 7¾
C	Central partition	1 pc.	5/16 × 5¼ × 14 15/16
D	Upper partition	2 pcs.	5/16 × 5¼ × 3 3/16
E	Lower partition	2 pcs.	5/16 × 5¼ × 4
F	Back panel	1 pc.	¼ × 7½ × 15 3/16
Upper Drawers			
G	Side	6 pcs.	¼ × 2⅞ × 5
H	Short back	2 pcs.	¼ × 2⅜ × 3 5/16
I	Long back	1 pc.	¼ × 2⅜ × 7¼
J	Short front	2 pcs.	⅝ × 2⅞ × 3 5/16
K	Long front	1 pc.	⅝ × 2⅞ × 7¼
Lower Drawers			
L	Side	6 pcs.	¼ × 3 11/16 × 5
M	Back	3 pcs.	¼ × 3 3/16 × 4⅝
N	Front	3 pcs.	⅝ × 3 11/16 × 4⅝
Miscellaneous			
Softwood fitting strip			
O	Upper drawer	6 pcs.	¼ × ⅜ × 2⅜
P	Lower drawer	6 pcs.	¼ × ⅜ × 3 3/16
Q	Pull	6 pcs.	½ × 1 (this includes tenon length)
R	Leg	4 pcs.	⅞ × 1¼ (this includes tenon length)

**These are net measurements. A surplus should be added to dovetailed parts to allow them to be sanded flush.*
**Opening measurements are given for drawer width and height. I subtract 1/16 from both dimensions. This gives me 1/32 clearance on all four sides of drawers.*

CHEST BACK The back is unglued, fastened with screws to the case's top, bottom and central partitions.

BACK RABBET This photo shows the lapped rabbet corner at the back of the case





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CHIIP BOX

Walnut, White Oak

MAKING THE CHIP BOX

Walnut was used in the construction *of this box with care* taken to select pieces exhibiting contrasting streaks of white sapwood. The bail was shaped from white oak. While any of a number of woods would do nicely for the box, make the bail from a wood that is not only strong but also pliable enough to assume the U shape without breaking. Suitable woods include oaks, ashes and hickories.

Construction is very simple. After milling the stock to a thickness of 1/2″, rip the sides, ends and bottom to width and cut to length. Then plough a 1/4″ X 1/4" groove in the *sides and ends to* receive the bottom. Then cut and pare dovetails to fit (see chapter twenty-five). With hand planes, bevel the edges of the bottom to allow them to slide in their grooves (see chapter one).

Then assemble the box and fit plugs into the ends of the grooves ploughed into the sides.

After removing the bail from its bending form, give its two paws their final shape using a paring chisel and a shop knife. Then fasten the bail to the box with four 1/8″ X 1 1/4″ brass machine screws and nuts.

SHAPING THE BAIL

The bail requires a 3/8"-thick length of continuous-grain bending stock. This means that, when viewed from the quarter-sawn side (the side with the narrow, parallel lines), the grain should run from end to end. Traditionally, this is achieved by splitting out the stock with the use of a froe and beetle. However, few contemporary woodworkers have these tools. You may, therefore, choose to use a length of sawn stock selected for straight grain.

Before bending, work the band-sawn strip with a drawknife and spokeshave to rough-in the desired shape. At this point, it isn't necessary to be fussy. The goal is simply to round the edges on the top side of the bail since this procedure can be carried out more comfortably now, when the stock is unbent, than later, when the bail has taken on its *U* shape.

STEAM BENDING

My steamer is a deep fat fryer. I've cut an opening in the lid the same size as the outside diameter of a length of PVC which I use as a steam chamber. Three sheet metal screws turned into the PVC just above its base are allowed to protrude. These rest on the fryer's lid holding the steam chamber above the water's surface. A square of hardware cloth that laps the bottom of the steam chamber and is screwed to the PVC supports the material being steamed. To hold the entire apparatus upright, a strip of wood lath is screwed to the PVC and spring-clamped to a stepladder.

Similarly, functional steamers can be made in a number of different ways. Many woodworkers use a hot plate and a tea kettle with a spout fitted with a length of plastic hose which conducts steam to a chamber of some sort—a wooden box, a length *of* downspout, or a section of PVC.

Steam the bending stock long enough to become plastic. In my steamer, with material of this thickness, that means about forty-five minutes.

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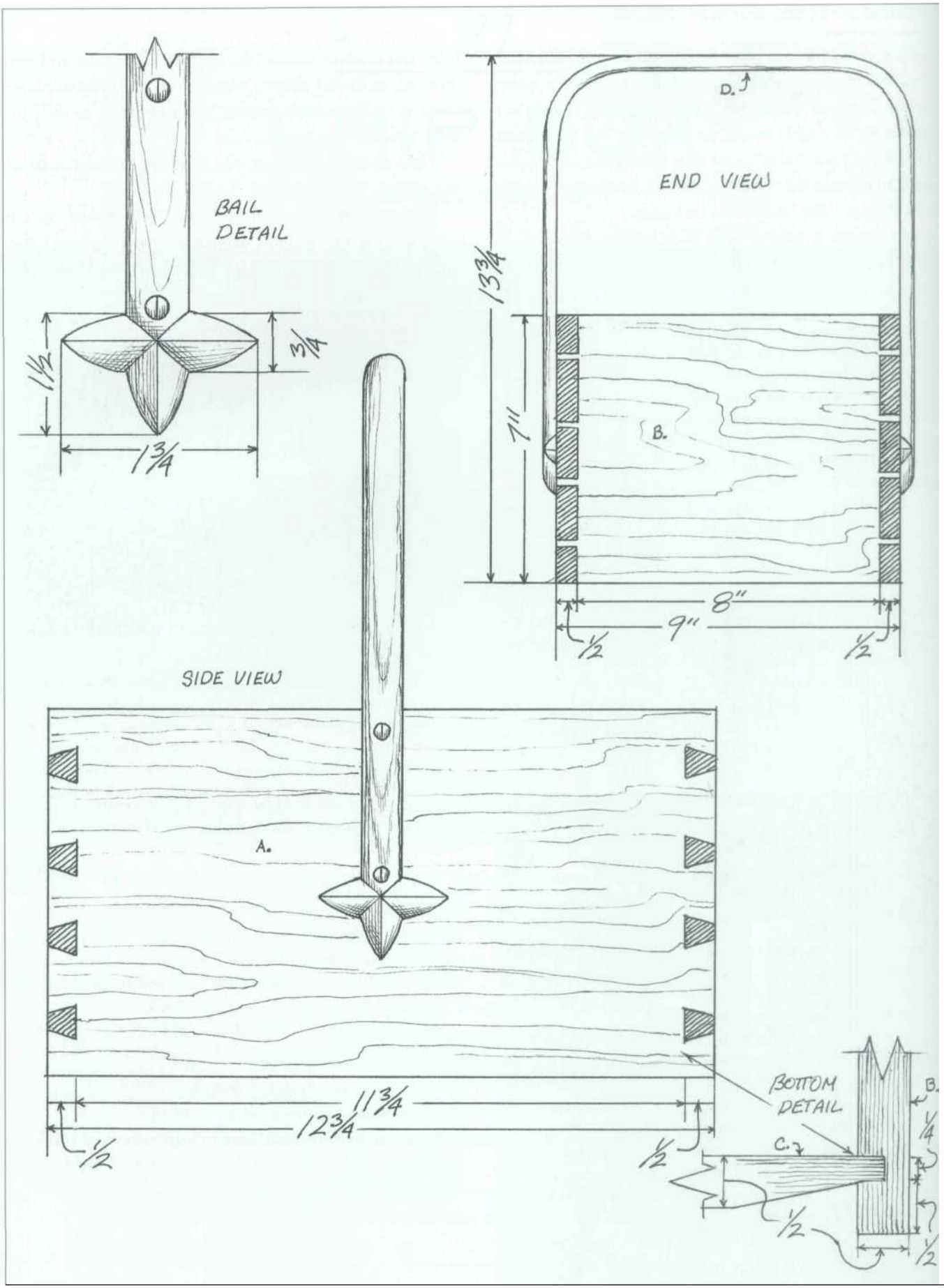

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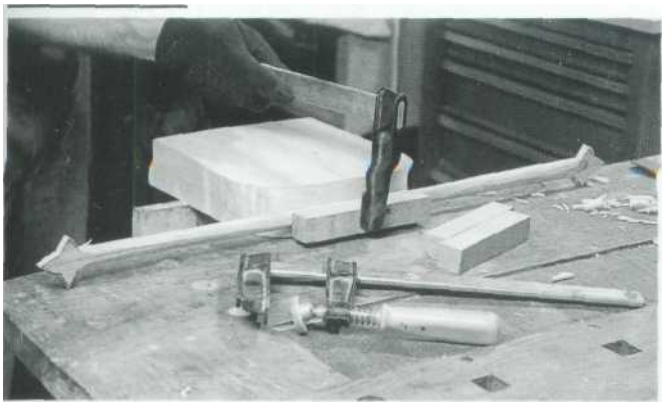
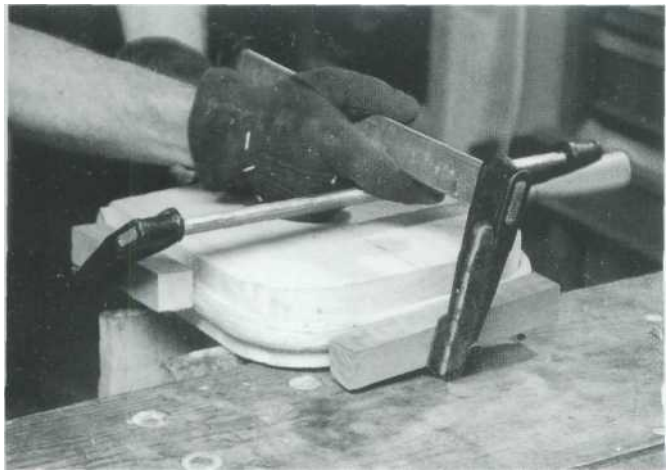
STEAM BENDING (CONTINUED)



2 Prepare bending forms beforehand. This particular form, a 2"-thick block of poplar cut to the inside profile of the bail, is nailed to a block of wood held in a vise. Necessary clamps and clamping blocks are placed nearby. Gloves are needed because the steamed oak will be very hot when removed from the steam chamber.

Although you shouldn't rush, proceed quickly because the steamed wood will cool rapidly, becoming less pliable.

Place the midway point along the length of the oak strip at the halfway point across the width of the poplar form. Then clamp it, using a block of wood to protect the oak from clamp marks.

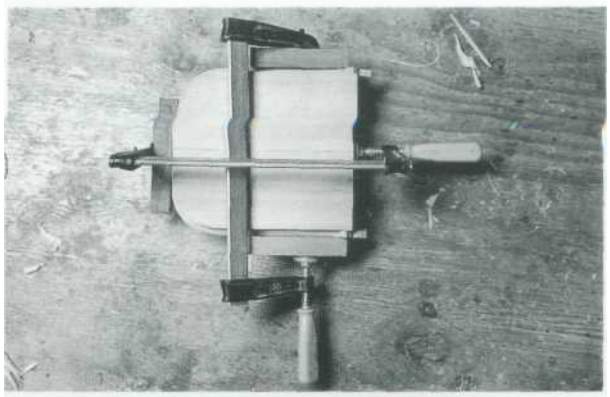


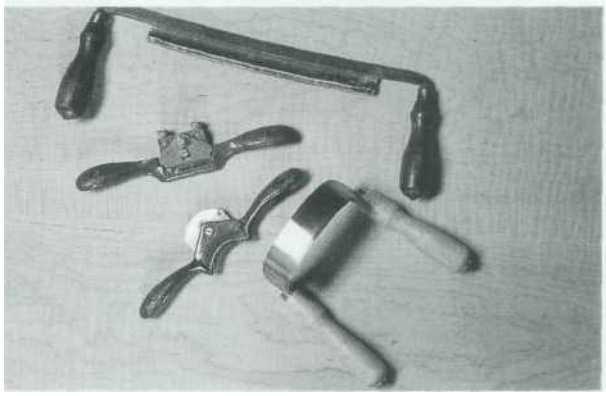
3 Bend the oak strip into its U shape, holding it in place with a second clamp set perpendicular to the first. Again, use blocks of scrap to protect the oak. From above, the strip can be seen to have assumed the shape of the bail.

Green wood is best for bending, but dry material can be coaxed into the required shapes with enough steam and enough patience.

Wood bending, particularly bending involving the sharp curves shown here, is a process rich with opportunities for failure. Sometimes, even after selecting continuous-grained material, even after steaming that material thoroughly, fracture can occur along the bends. When that happens, the only solution is to start the process all over again.

SHAVING TOOLS





Shown are the shaving tools I use in my shop. The two with turned wooden handles are drawknives. The knife at the top is a general-purpose tool, while the one at the bottom is a variety known as the "inshave" used by makers of Windsor chairs to hollow-out seats. The two middle tools are metal-bodied spokeshaves. The shave with the straight iron is used for general-purpose work, while the other, a hollow shave, can only be used for rounding spindles.

MATERIALS LIST

A	Side	2 pcs.	½×7×12¾
B	End	2 pcs.	½×7×9
C	Bottom	1 pc.	½×8½×12¼
D	Bail	1 pc.	⅜×2⅛×29
E	Plug	4 pcs.	¼×¼×¼, shaved to fit
F	Machine screws & nuts	4 pcs.	⅛×1¼

**These are net measurements. Surplus should be added to lengths of dovetailed sides and ends to allow joints to be sanded flush.*

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Pegged Display Shelf

Curly Maple, Walnut

MAKING THE PEGGED DISPLAY SHELF

After the material has been dimensioned, profile the end panels, the back panels, and the lower shelf on the band saw. Form the moulded edge on the top on a shaper or table-mounted router fit with appropriate cutters.

Next, cut joinery. You can cut the stopped rabbet that will house the ends of the back panel on the table saw (see chapter five), with a table-mounted router, or by hand, using chisels.

Cut the through mortises in the end panels (see chapter twelve). Then, with a backsaw or a stack of dado cutters on the table saw, cut the tenons on the ends of the lower shelf and pare to fit these mortises.

On the lathe, turn the two Shaker-style pegs. Then, fit their tenons into mortises drilled into the shelf's back panel.

When all the parts have been dry-assembled and checked for fit, glue the frame and screw it together. Install the top, using four 1" no. 6 wood screws passing through the top into the end grain of the side panels. Glue four maple plugs and tap them into the countersunk screw holes.

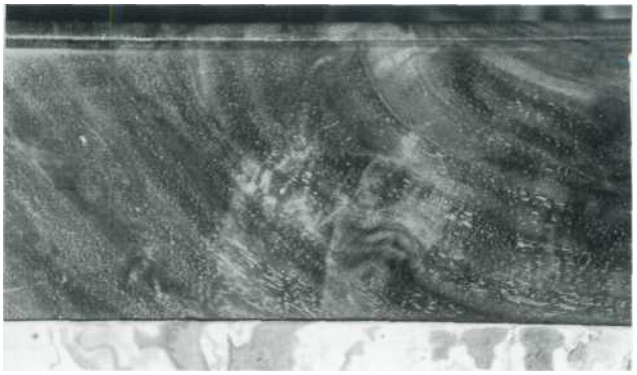
FIGURED LANGUAGE

In *The Woodworker's Dictionary* by Englishman Vic Taylor, the word *curlis* defined this way: "Highly figured grain obtained by cutting through the junction of a tree or large limb. Used only in veneer form. Also known as crotch or feather."

If you ordered curly material from an American supplier of figured wood, you would not get the material described by Vic Taylor. You would, instead, get lumber marked by rippling bars of grain marching across the widths of the boards perpendicular to the grain direction. This inconsistency of language occurs not only among dealers working in different countries but also among dealers in the U.S.

One of the sawmill operators from whom I buy has his own system of figured wood classification: If it tears out in the planer, it's curly. Period. And he sells it that way. Because I've bought from him in the past and am aware of his system of classification, I carefully inspect every curly board I buy from him, but a customer unfamiliar with his system might assume that whatever he purchased from this sawmill operator as curly would exhibit a figure that was consistent from board to board and consistent with the buyer's expectation of curly lumber.

In general I've found that owner/operators of small sawmills aren't good sources of figured lumber. In part, this may be because they are sawyers, not woodworkers, and therefore look at lumber from a different perspective. But I also think that owner/operators of small sawmills don't have the experience with figured lumber to make considered judgments about its quality.



1 The border of the chess table (featured in chapter three) shows the kind of figuring common in crotch-grained lumber.

2 Tiny dots are scattered across the surface of this piece of bird's eye maple. (This grain is used on the top of the display shelf in this chapter.)

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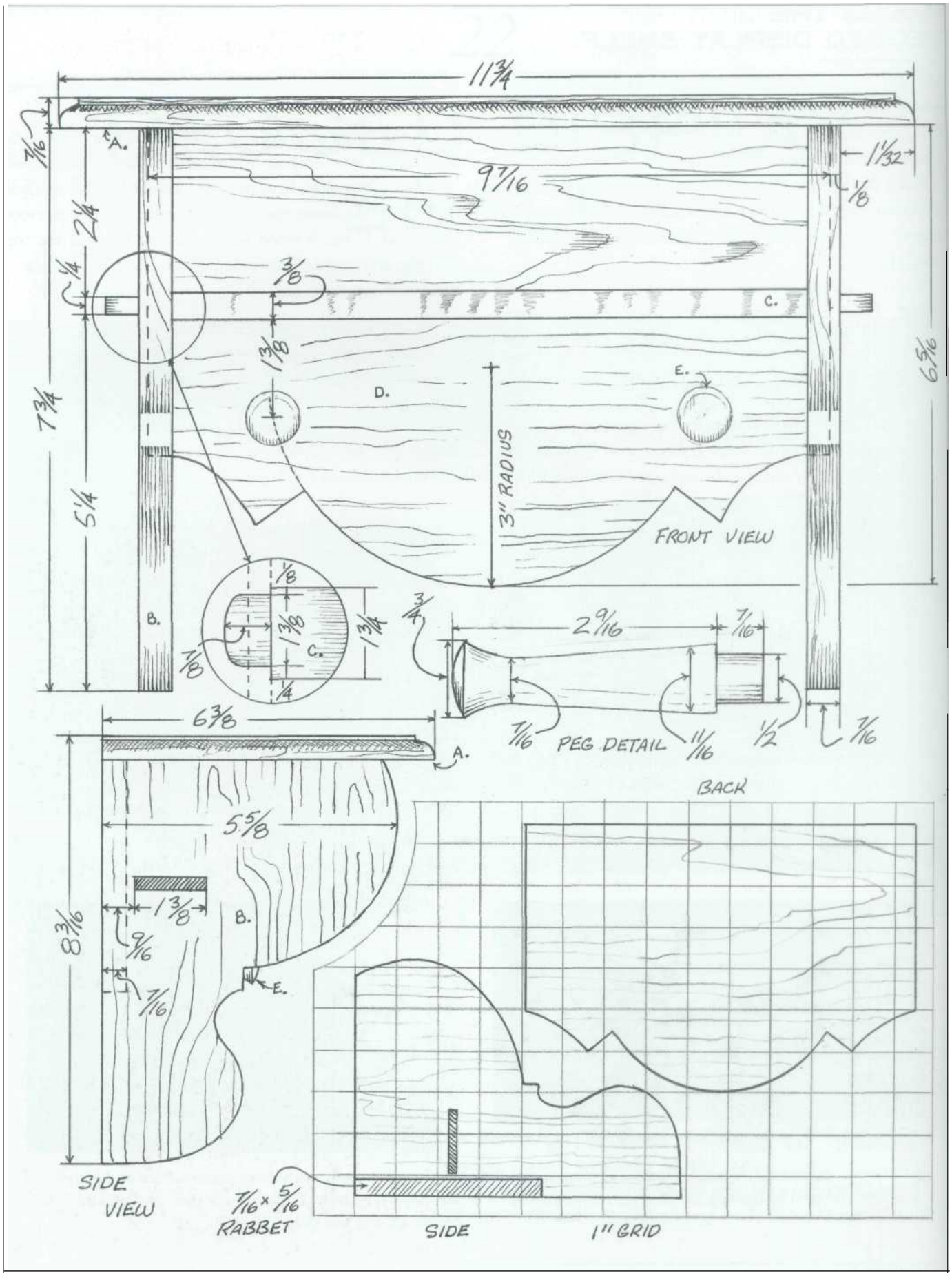

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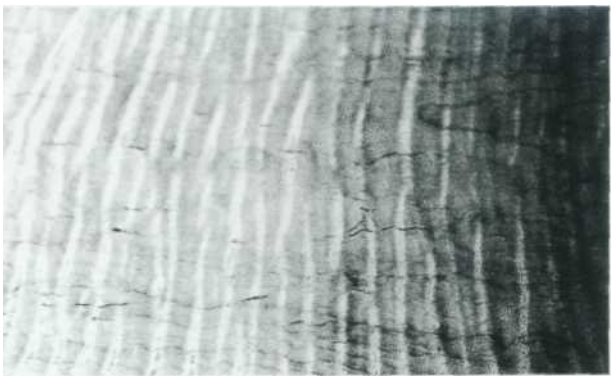
Tiger maple. Often referred to by the generic "curly," the wood identified by this term includes the soft (red and silver) curly maples.
Fiddleback maple. This material, characterized by a tighter, more compact curl than is evident in tiger maple, comes from hard maple and is widely used by violin makers for the backs of their instruments.
Blistered maple. This figure, which is also present in hard maple, has a surface on which there is the appearance of raised blisters or boils.

Quilted maple. A product of the western big-leaf maple, this material is marked by a regular pattern of what appear to be raised areas of varying shapes.
Bird's eye maple. This variety of hard maple exhibits swirling grain scattered with dots resembling bird's eyes.
Crotch-grained. For American woodworkers, this is the material about which Vic Taylor wrote in his definition of "curly." Sometimes known as "feathered," this is taken from the junction of a tree and a large limb.
Burl. Taken from growths that appear on the trunks of certain trees, this material is highly prized by makers of veneer and by turners for its wildly convoluted grain.

3 This panel of glued-up cherry exhibits a wavy figure not uncommon in cherry (see the side table in chapter seven for an excellent example).



4 This photo shows a length of heavily figured curly (tiger) maple (featured in the document chest in chapter twenty five).

SUSTAINABLE FORESTS

At some point, everyone who applies tools to wood considers the issue of forest maintenance. Although many experts believe that reserves of the commonly used American species are adequate to meet projected needs, there is an irrefutable difference in the quality of available material. Although cherry, maple and oak are always on hand in any well-stocked lumberyard, the boards are not as wide and not as clear as they were even a single generation in the past. And the situation is even more critical for walnut, the king of American hardwoods. Walnut saw logs are increasingly rare, and when they can be found of any quality, they are inevitably snatched up by veneer mills.

MATERIALS LIST

A	Top	1 pc.	7/16 × 6⅜ × 11¾
B	End	2 pcs.	7/16 × 5⅝ × 7¾
C	Shelf	1 pc.	⅜ × 1¾ × 10½
D	Back	1 pc.	7/16 × 6 5/16 × 9 7/16
E	Peg	2 pcs.	¾ × 3
F	Plug	4 pcs.	⅜ × ¼
G	Screws	various	

TABLETOP DESK

Cherry, Poplar

MAKING THE TABLETOP DESK

After the material has been dimensioned, edge-joint and glue the boards that will make up the desk top.

Plough a 1/8" X 1/4" groove on the inside faces of the desk sides, front, and back. This groove will later receive the bottom of the materials compartment. Then, cut openings in the sides for the inkwell and stationery drawers.

Next, cut the angles on the desk sides on the band saw, after which the four sides of the case are dovetailed. The case is dry-assembled, and the bevels on the top edge of the front and back are marked from the angles on the sides. Form these bevels with a hand plane, and glue-up the four walls of the case around the bottom of the materials compartment.

Before installing the bottom, glue and brad into place the cock bead that frames the stationery drawer. Also at this time, glue the two fill strips that will guide the stationery drawer in position. Then, tack the bottom into place using small finishing nails. Nails are perhaps better than screws for this particular application because they are flexible enough to allow for seasonal expansion and contraction of the bottom across its width. Screws—unless they pass through oversized holes which would be very difficult to achieve in such thin stock—could lock the material so that cracking would occur in connection with this expansion and contraction.

The inkwell drawer is next. The unusually shaped long drawer side does two things. First, it is a drawer guide, and second, it prevents the drawer (with its bottle of ink) from being completely withdrawn from the case, a circumstance that could easily have had messy results.

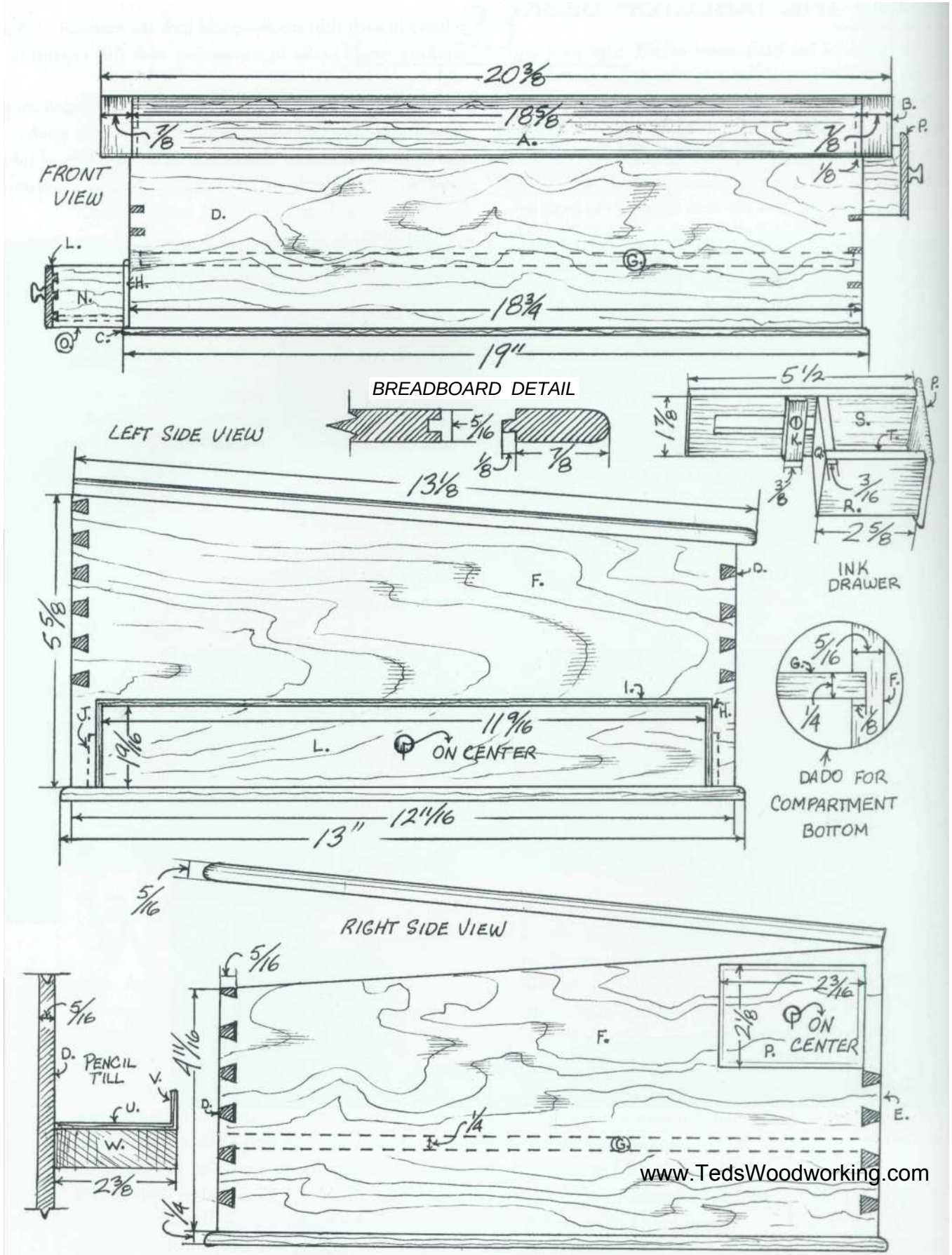
After forming the drawer parts, glue and tack them together. Then, fit the drawer to its opening and screw the wooden bracket that acts as its guide and keeper to the inside face of the desk back.

Assemble the stationery drawer with through dovetails at the front and half-blind dovetails at the back.

The till rests on a pair of 1/8"-thick supports which are glued to the inside faces of the desk front and back. After installing these supports, glue the till—with its side already glued to the bottom—into place atop the supports. Fasten it also to the desk side with a thin line of glue.

The top panel is removed from the clamps and planed to a thickness of 5/16". Then, cut 1/8"X 1/8" grooves in both ends of the top panel to receive the tongues on the breadboard ends. Form and fit the tongues to the grooves. Hold

The opened tabletop desk reveals the ink well drawer and the paper drawer in the bottom.



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each breadboard end in place with a dab of glue on the tongue at the middle of the tongue's length. The remainder of the tongue floats on the groove, allowing for seasonal expansion and contraction of the top.

Hinges are problems because of the top's extreme thinness. My dad, who built this particular piece, struggled to find screws that could get a good enough bite in the top to hold it in place. After trying and discarding several brass screws, he settled on deep-threaded 3/8″ no. 6 steel screws from which he'd ground away the tips so that they wouldn't penetrate the upper surface of the top.

After fitting the hinges, remove the hardware, and give the desk a final sanding.

KILN-DRIED OR AIR-DRIED

Reference books inevitably cite the necessity of using kiln-dried material for funiture construction. I think that's misleading.

Of the thousands of board feet of lumber I've turned into chairs and into casework, less than a quarter was kiln-dried. The remainder was air-dired outdoors and finish-dried in my shop. Nevertheless, I can remember only two occasions when pieces I built experienced wood failure.

Once, I built a Hepplewhite huntboard from air-dried cherry. The top (which didn't fail) was fastened to cleats fixed with slotted screw holes. But one of the end panels, which I had triple-tenoned into the posts, split after sitting in our living room through a couple of cold, dry Ohio winters. In looking back on the construction of the huntboard, I remember hurrying to finish it before Christmas since it was a present for my wife.

When I glued up the end panels, I remember noticing, as I slathered glue on the middle tenon, that I hadn't cut the top and bottom tenons back to allow the end panel to shrink. Each tenon completely filled its mortise. But the glue was already on the middle tenon and in its mortise. To cut the other tenons back, I would have to wash away the glue, find my paring chisel, pare the tenons, and reglue. Or risk having the aliphatic resin glue set before the joint was assembled. I remember thinking it wasn't worth the effort. I remember thinking I could get away with it. The end panel failed because I built it to fail. I think that if allowances are made during design for the inevitable movement of wood, carefully air-dried material is every bit as good as kiln-dried. In fact, I think that careful air-drying is preferable to the kind of rushed kiln-drying practiced by some commercial driers. At least in humid Ohio, air-drying is a gradual process during which wood surrenders its mosture so slowly that surface checking is almost unheard of. And it's worth mentioning that, just like air-dried stock, kiln-dried stock, when exposed to humid, July conditions, quickly takes on enough moisture to reach 11, 12 or even 13 percent.

The answer to the problem of wood movement isn't laboring to make wood inert; it is, I think, to accept movement as an inevitable component of solid-wood construction and to design to accommodate that inevitability.

MATERIALS LIST

Desk			
A	Top	1 pc.	5/16 × 13⅛ × 18⅝
B	Breadboard end	2 pcs.	5/16 × 1 × 13⅛
C	Bottom	1 pc.	¼ × 13 × 1
D	Front	1 pc.	5/16 × 4 11/16 × 18¾
E	Back	1 pc.	5/16 × 5⅝ × 18¾
F	Side	2 pcs.	5/16 × 5⅝ × 12 11/16
G	Compartment bottom	1 pc.	¼ × 12 5/16 × 18⅜
H	Short cock bead	2 pcs.	⅛ × ½ × 1⅞
I	Long cock bead	1 pc.	⅛ × ½ × 11⅞
J	Drawer fill strip	2 pcs.	⅛ × 1 × 16¼
K	Ink-drawer stop	1 pc.	⅜ × ⅜ × 1⅞
Stationery drawer			
L	Front	1 pc.	5/16 × 1 9/16 × 11 9/16
M	Back	1 pc.	¼ × 1 9/16 × 11 9/16
N	Side	2 pcs.	¼ × 1 9/16 × 18
O	Bottom	1 pc.	¼ × 11 5/16 × 18¼
Ink drawer			
P	Front	1 pc.	5/16 × 2⅛ × 2 13/16
Q	Back	1 pc.	3/16 × 1⅞ × 2 3/32
R	Short side	1 pc.	3/16 × 1⅞ × 2⅜
S	Long side	1 pc.	3/16 × 1⅞ × 5½
T	Bottom	1 pc.	3/16 × 2 11/32 × 2½
Pencil till			
U	Bottom	1 pc.	⅛ × 2¼ × 12 1/16
V	Side	1 pc.	⅛ × ¾ × 12 1/16
W	Support	2 pcs.	⅛ × ¾ × 2⅜
Hardware			
X	Hinge	2 pcs.	1½ × ⅞
Y	Pull	2 pcs.	½ × ½
Z	Screws and nails	various	

**These are net measurements. A surplus should be added to dovetailed parts to allow them to be sanded flush.*

**Pulls were ordered from Constantine's Hardware.*

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Sheraton Style Table

Walnut, White Pine

MAKING THE SHERATON-STYLE TABLE

Begin construction with the legs. The exact shapes of their various *sections can* be determined by the individual woodworker; however, the section that will be joined to the apron, that section above the upper bead, must be carefully formed so that it maintains a consistent diameter from top to bottom as any variation in diameter will show itself here as a gap.

Once a leg has been formed but before it's taken from the lathe, mark the centerlines for the mortises that will receive the apron tenons. Do this using the lathe's indexing head.

The indexing head is a disk centered on the lathe's axis with holes drilled near its perimeter. Each of these holes marks 10° of the disk's 360° circumference and, by extension, 10° of the 360° circumference of any work centered on the lathe's axis. After selecting the faces of the leg that will be visible from the table's side and end, the tool rest is brought into contact with that section of the leg that will be joined to the apron. The indexing head is then locked at this position (on my lathe that's simply a matter of releasing a spring-loaded peg into one of the holes drilled near the head's circumference) and a line is drawn along the tool rest on the leg. Then, using the spring-loaded peg to count holes, the work is turned nine stops on the indexing head which is then locked at this point and a second line drawn. These lines are 90° apart and mark the centerlines of the mortises that will house the apron tenons.

After the apron parts and drawer rails have been dimensioned, cut their tenons. You can start this on the table saw, but it must be completed by hand or on the band saw as the shoulders of the apron parts must be undercut so that the shoulders come to a sharp point. This is necessary if the shoulders are to make tight contact with the round surface of the leg.

The table frame—consisting of the four legs, the three sections of the apron, and the two drawer rails—is then glued-up.

Next, install drawer runners and kicker strips. The kicker strips on this table serve two purposes. First, they keep the drawer properly aligned when it is partially open. Second, they act as cleats to affix the table's top to its base. In order to accommodate the seasonal expansion and contraction of the top across its width, the screws that fasten the top to the base should pass through oversized holes in the kicker strips.

Drawer construction *is tricky* in one respect. *Like the* parts of the apron and the drawer rails, the drawer front must be shaped to allow it to be closed so that its surface is flush with the surface of the drawer rails without wide gaps at either side. Like the apron and drawer rail shoulders, the drawer front could be undercut, but I wanted a more graceful shape in this location because it is visible when the drawer is opened. I decided then to curve the back side of the drawer front, matching it to the curve on the legs. After fitting the drawer, sand and finish the table and drawer.

MATERIALS LIST

Table			
A	Top	1 pc.	¾ × 17 × 23½
B	Leg	4 pcs.	2 7/16 × 2 7/16 × 23
C	Apron side	2 pcs.	⅞ × 5⅛ × 18¾ (includes ⅞ tenon on each end)
D	Apron end	1 pc.	⅞ × 5 ⅛ × 12¼ (with tenons)
E	Top drawer rail	1 pc.	⅞ × 1¼ × 12¼ (with tenons)
F	Bottom drawer rail	1 pc.	⅞ × ⅞ × 12¼ (with tenons)
G	Kicker strip	2 pcs.	1¼ × 1½ × 17⅞
H	Drawer runner	2 pcs.	⅞ × ⅞ × 17⅞
Drawer			
I	Drawer front	1 pc.	⅞ × 2 15/16 × 10½
J	Drawer back	1 pc.	½ × 2 15/16 × 10
K	Drawer side	2 pcs.	½ × 2 15/16 × 17
Hardware			
L	*Brass knob*	*1 pc.*	*½ × ½*
M	Screws	various	

**These are net measurements. A surplus should be added to dovetailed parts to allow them to be sanded flush.*
**Pull was ordered from Constantine's Hardware.*

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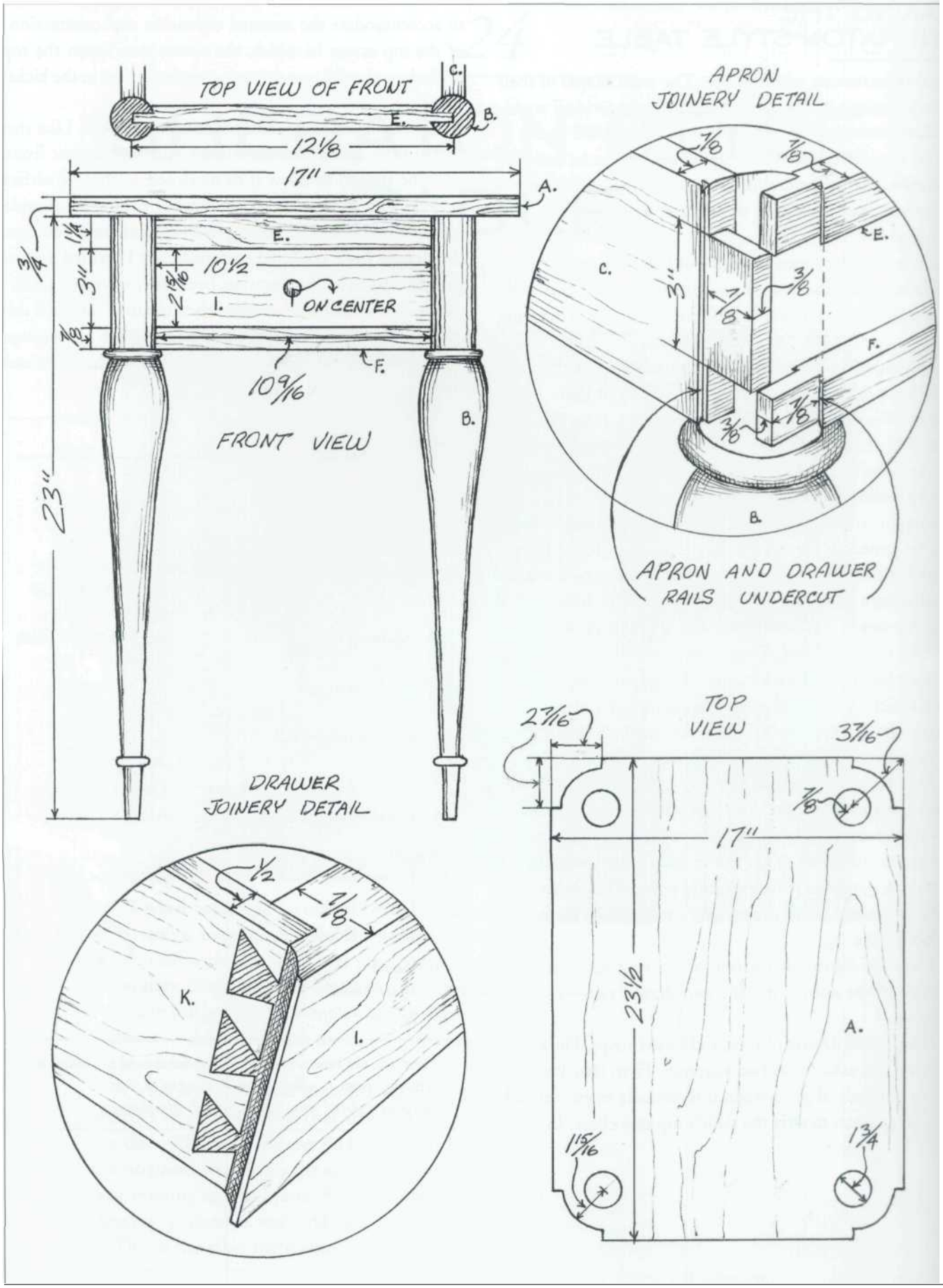

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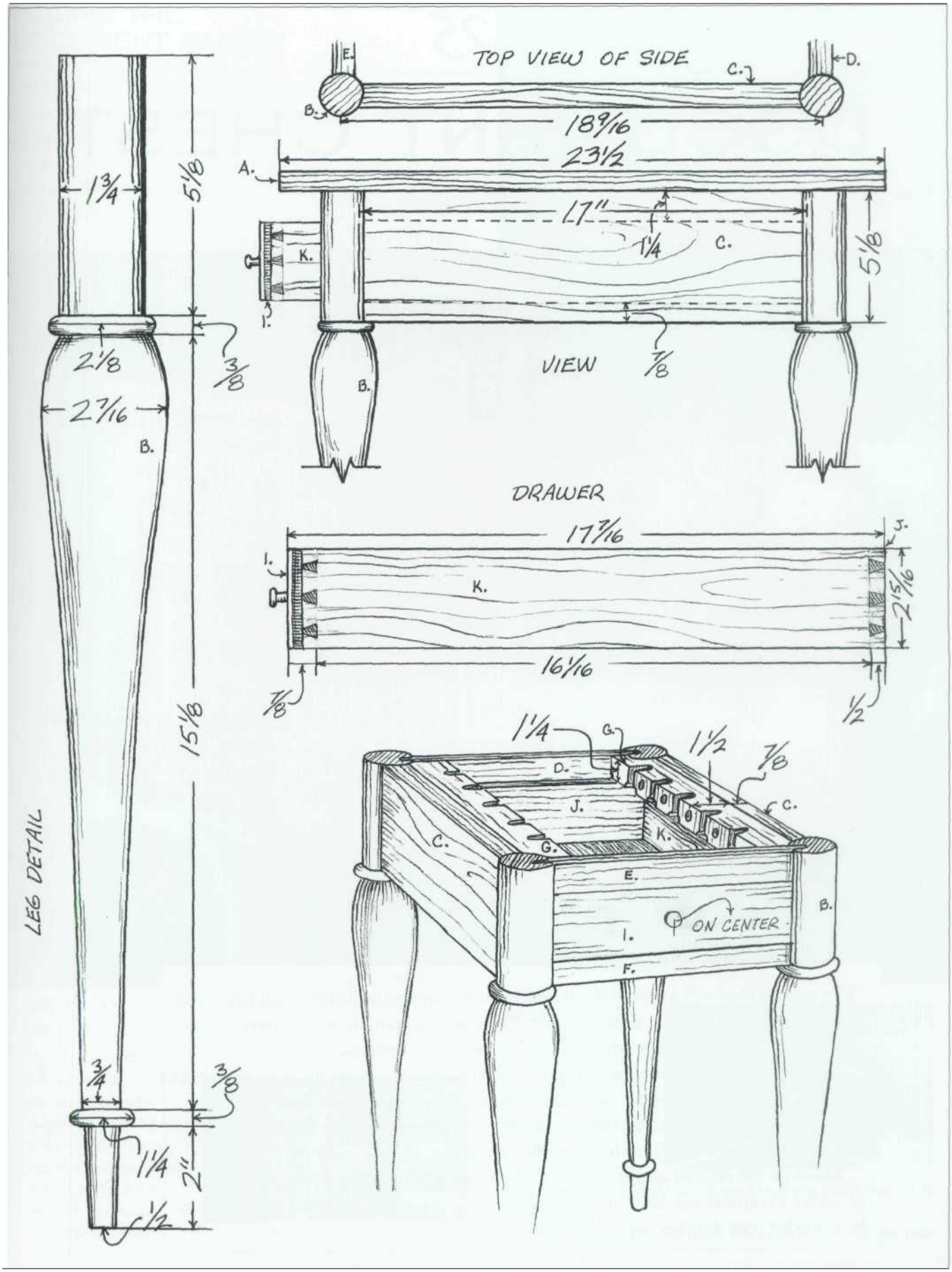

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Document Chest

Curly Maple, White Pine

MAKING THE DOCUMENT CHEST

After the stock has been thicknessed, ripped to width, and cut to length, plough a 1/4" X 3/8" groove on the inside faces of the front, back and two ends. This groove will receive the raised panel that will separate the upper storage chamber from the drawer compartment.

Then cut through dovetails for the four corners of the case (this process is detailed in the sidebar below). Glue the joints and assemble the case around the raised panel that separates its two sections.

Shape the moulded edge on the top and bottom of the lid and on the top side of the chest's bottom. Fasten the bottom to the case with ten 1 1/2" no. 10 wood screws. These pass through oversized holes drilled in the bottom to allow tor seasonal expansion and contraction across its width.

Although the Shaker original didn't have them, I installed a pair of sturdy ash cleats on the underside of the lid to prevent it from cupping—a problem I encountered the first time I built one of these chests.

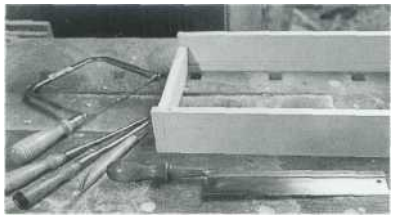
Build the drawer next (see the sidebar below) with through dovetails at the rear and half-blind dovetails at the front. Slide the drawer bottom into its groove and tack it up into the drawer back. Then fit the length of the completed drawer by planing thickness from a pair of softwood strips tacked to the back side of the drawer.

Complete the chest by finishing the wood and installing the hardware.

CUTTING DOVETAILS BY HAND

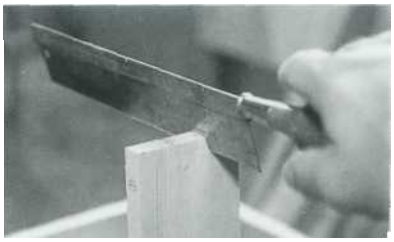
There's something soothing about the process of cutting dovetails by hand. The shop is quiet. The air is clean, carrying no load of machine-generated dust. There is the sense that this is what woodworking is supposed to be: calm, unhurried, not driven by the frantic scream and whine of power tools. This is woodworking stripped of the efficient unpleasantness of technology, reduced to the application of sharp tools to beautiful material. Even though the case must be made first, the following discussion of hand-cut dovetails will begin with drawer construction because, unlike the case, the drawer requires the creation of both through and half-blind dovetails.

1 The process begins with careful stock preparation. After the parts have been dimensioned, cut the grooves into which the drawer bottom will slide. Establish base-



lines for every pin and tail (the pins are those parts of the dovetail joint that fit between the tails). Score these lines across the grain with either a marking gauge or a sharp knife. In the case of the through dovetails (those on the back of the drawer), lines should be placed a distance from the end that is 1/16" more than the thickness of the stock to which the piece is being joined. Since, in this case, the drawer sides and back are 1/2" thick, the baselines will be set 9/16" from the ends of the drawer sides and back. Placement of the baselines on the front end of the drawer sides is handled a little differently because these joints will be half-blind dovetails. Because the drawer front is 11/16" thick, set the baselines on the front ends of the drawer sides 1/2" from the end. This leaves 3/16" of drawer-front material covering the ends of the dovetails on the front ends of the drawer sides.

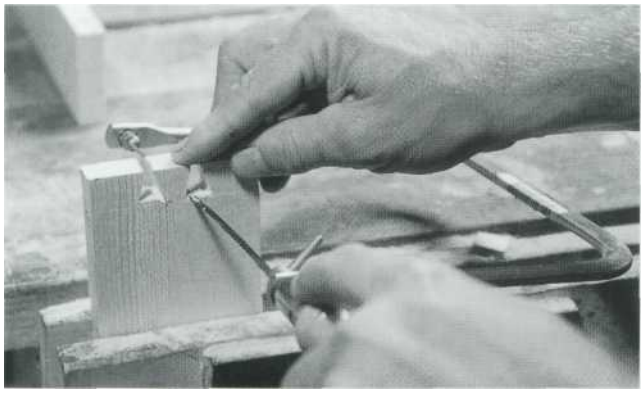
2 Cut the tails first. After deciding on their widths, use pencil lines (drawn with the aid of a try square) to mark the end grain of the drawer side. These lines indicate the widths of the gaps between the widest parts of the tails.



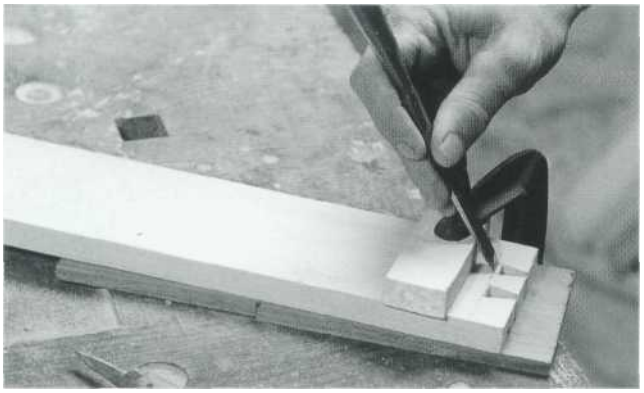
At this point, you can mark the actual angles of the tails

with the aid of a dovetail gauge. I chose to cut these freehand because the slight variances of angles and tail-widths provide incontrovertible proof of the piece's handmade origin.

With a fine-toothed backsaw, make cuts from the lines squared across the end grain down to the baseline established for the tails.

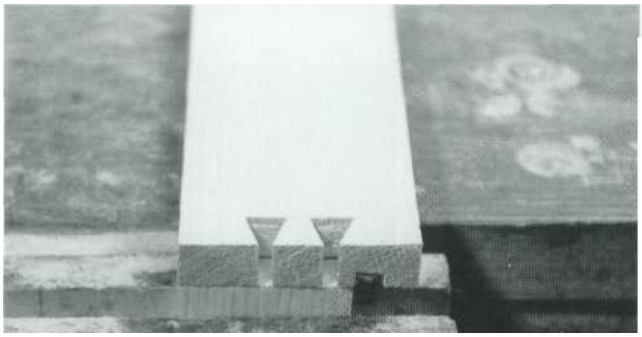


3 With a coping saw, remove the bulk of the waste. Don't approach the scored baseline too closely.



4 Then, use a paring chisel driven by a wooden mallet to cut away the remaining waste. The scored baseline serves to position the tip of the chisel.

In order to avoid breaking out chips on the back side of the piece, flip over the drawer side from time to time, working toward the middle from one side, then the other.



5 When the gaps between the tails have been cut and pared down to the baseline, mark the pins. Position the pin

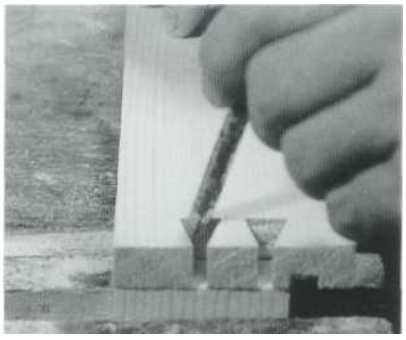
MATERIALS LIST

Chest		
A Side	2 pcs.	11/16 × 10¼ × 18⅜
B Full End	1 pc.	11/16 × 10¼ × 10⅞
C Partial End	1 pc.	11/16 × 7⅛ × 10⅞
D Lid and bottom	2 pcs.	11/16 × 11⅜ × 18⅞
E Bottom of storage chamber	1 pc.	⅝ × 9⅞ × 17⅜
F Cleats	2 pcs.	1⅛ × 1⅞ × 8
G Plug	4 pcs.	¼ × ⅜ × ½
Drawer		
H Front	1 pc.	11/16 × 3 1/16 × 9⅜
I Side	2 pcs.	½ × 3 1/16 × 17
J Back	1 pc.	½ × 2⅛ × 9 7/16
K Bottom	1 pc.	⅝ × 8½ × 16¾
L Fitting strip	2 pcs.	⅜ × ⅜ × 2⅛
Hardware		
M Hinges	2 pcs.	1¼ × 2
N Pull (brass)	1 pc.	½ × ½
O Closer	1 pc.	
P Screws	10 pcs.	1½" no. 10

**These are net measurements. Surplus should be added to the length of dovetailed sides and ends to allow joints to be sanded flush.*
**Drawer height and width are 1/16" less than the opening size. This allows 1/32" clearance on all four sides.*
**Hardware was ordered from Constantine's Hardware.*

stock (in this case the back of the drawer) in a vise so that its end is just above the level of the bench top. Position the tails that were just cut above the end grain on the drawer back. Take care to align the baseline between the tails directly above the inside face of the drawer back.

(Because the drawer bottom must slide underneath the back of the drawer, the width of the back extends only from the top of the drawer side to the top of the groove.)



6 With a sharp pencil (you may need to whittle the tip of the pencil to a smaller diameter so that it can work its way into the gaps between tails), mark the limits of the pins on the end grain of the drawer back.

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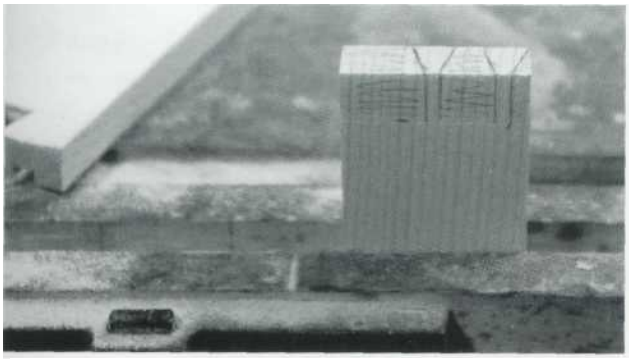
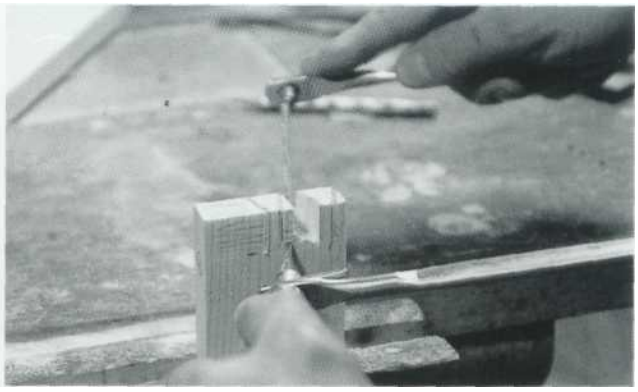
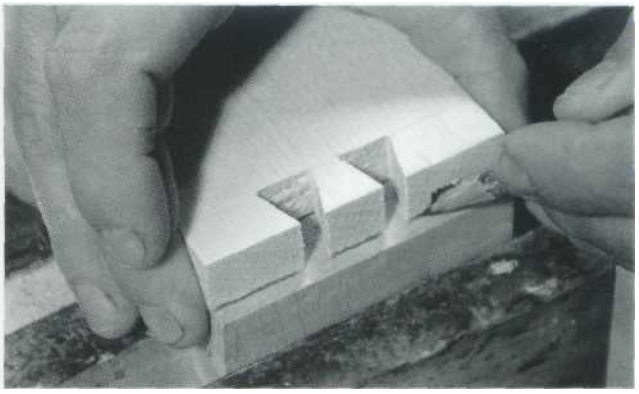




7 Using a try square, extend those lines from the end of the drawer back to the scored baseline for the pins. These lines identify the waste that is to be removed.

With a fine-toothed backsaw set just to the waste side of each line, cut the pin walls down as far as the baseline.

8 With a coping saw, remove the bulk of the waste between the pins. As with the gaps between the tails, cut away the remaining waste between the pins with a sharp chisel. Again, use the scored baseline to position the tip of the chisel.

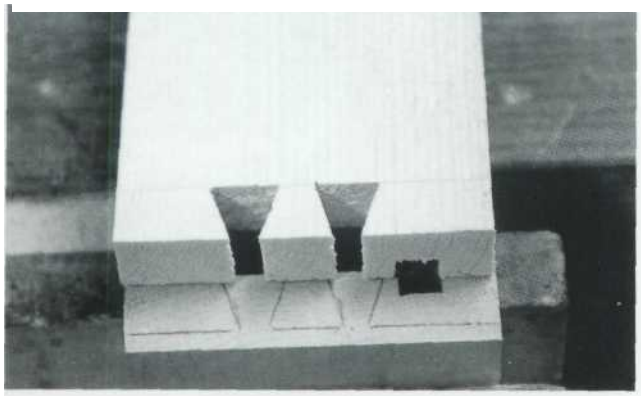


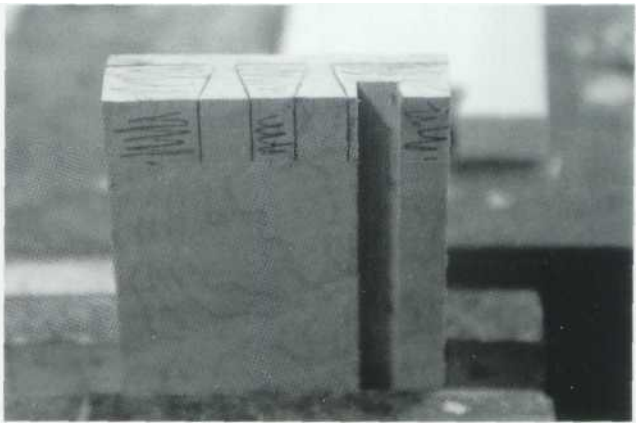
9 Shaving some of the pin walls may be necessary, but once fitting is accomplished, the joint can be dry-assembled (without glue).

White pine is a very soft wood, so a joint that might not fit perfectly can still be brought together. Hardwood, however, requires more fine-tuning of the pins with a paring chisel. Too much force applied to the fitting of a dovetailed joint can result in a split drawer side.

10 The half-blind dovetails (so named because the joint doesn't show from the front) used at the front of the drawer are a bit more complicated to cut.

Again, the process begins by cutting the tails. Then lay these across the end grain of the drawer front, and mark the perimeter of each tail on the drawer front.





11 The marking can be seen more clearly here.

12 With a try square, extend the lines from the end of the drawer front to the scored baseline. Scribbling indicates waste.

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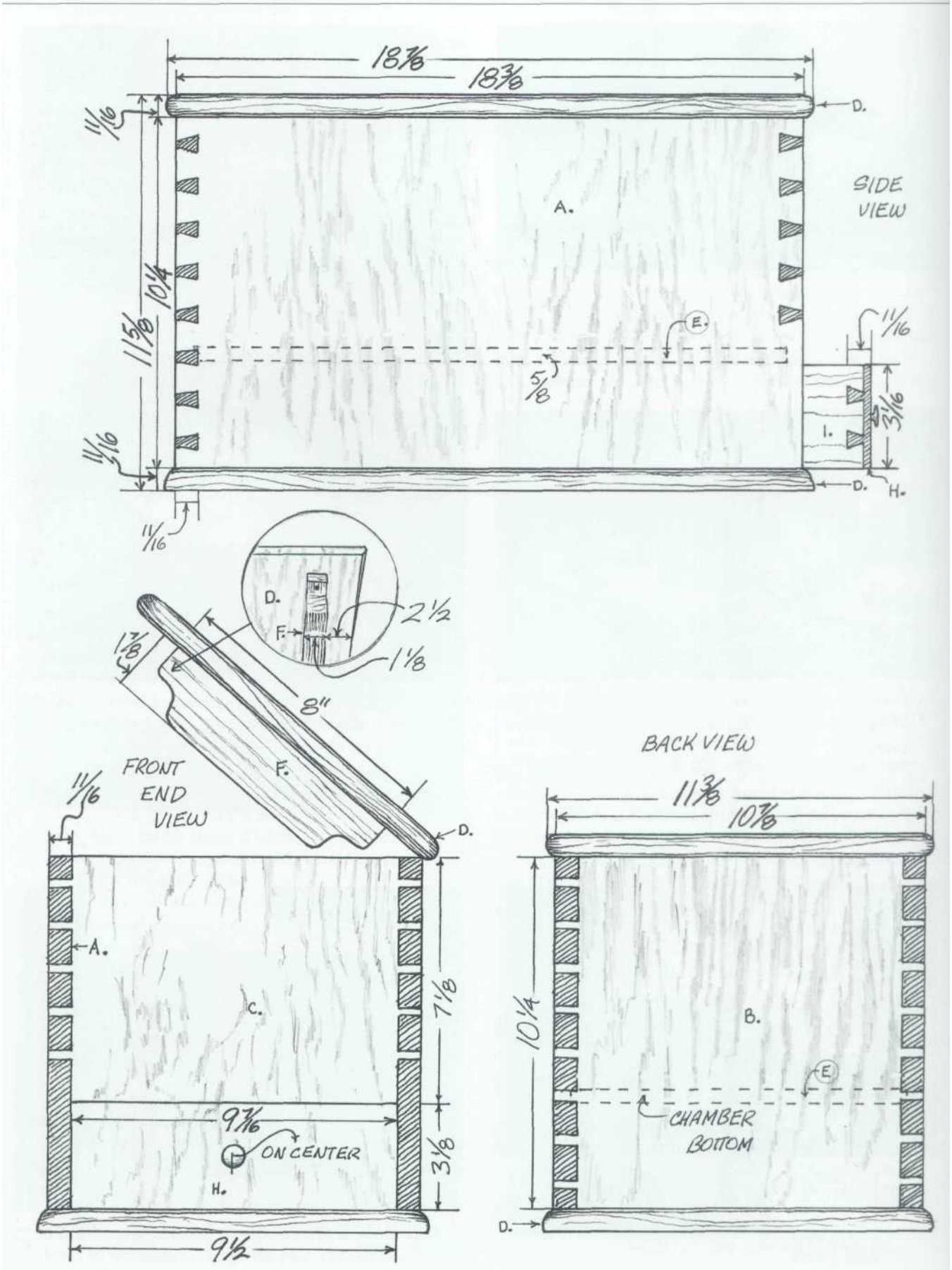
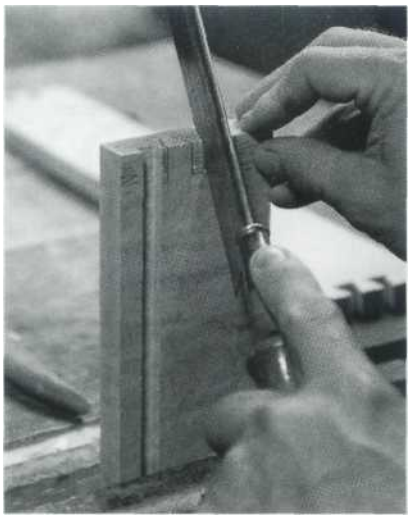
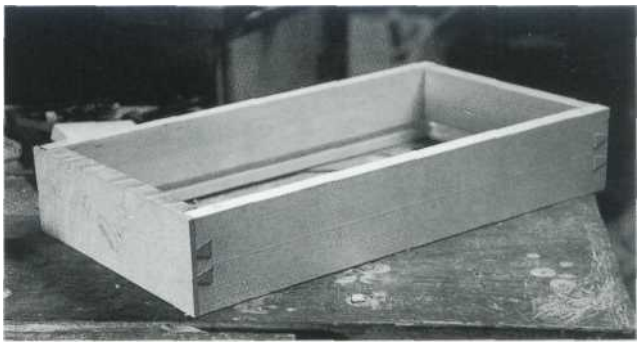

18 3/8
18 3/8
11/16
D.
A.
SIDE VIEW
10 1/4
11 5/8
E.
5/8
11/16
3 1/16
I.
11/16
D.
H.
11/16
D.
2 1/2
F.
1 1/8
1 7/8
8"
F.
FRONT END VIEW
11/16
D.
A.
C.
7 1/8
9 7/16
ON CENTER
H.
3/8
9 1/2
BACK VIEW
11 3/8
10 7/8
10 1/4
B.
E.
CHAMBER BOTTOM
D.



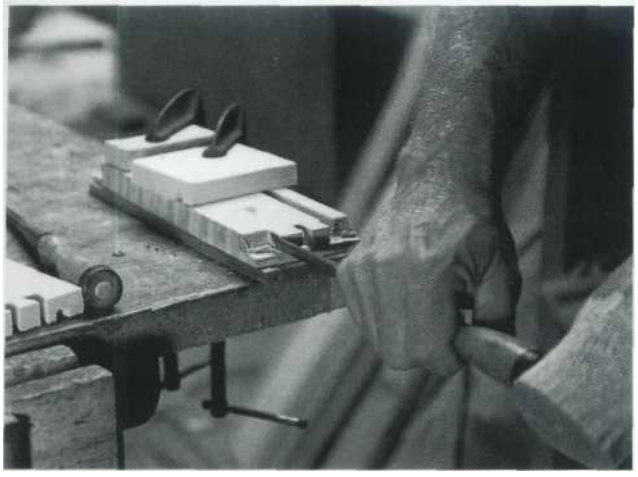
13 With a backsaw positioned just to the waste side of each line and held at about a 45° angle, define the sides of each pin by a saw kerf that connects the baseline on the back of the drawer front with the line drawn on the end grain indicating the forward limit of the tails.



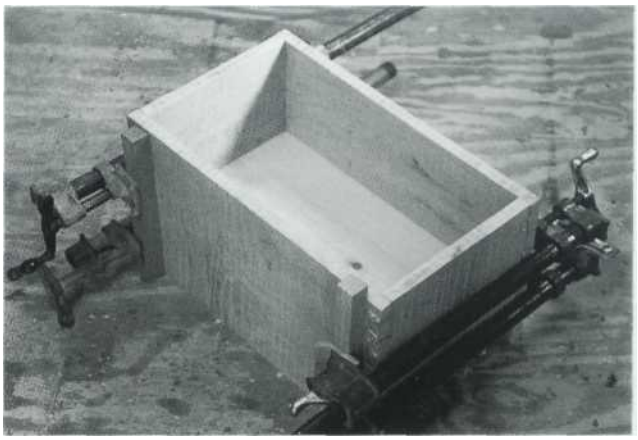
16 The dry-assembled drawer shows through dovetails at the back and half-blind dovetails at the front.

14 Then clamp the drawer front to the bench with its inside face up. Cut away the waste with a mallet and chisel.

17 The procedure for dovetailing the sides of the case is the same as that used for the back of the drawer with two important differences: First, because of the board widths, there will be many more pins and tails, making joint fitting more time-consuming. Second, because the joint components are hardwood, they must be fit more carefully. Forcing a hardwood joint nearly always results in split stock.



15 Carefully (to avoid splitting the drawer front), shape the sides of the pins with the chisel.



18 Assemble the case around the bottom of the storage chamber. The edges of this bottom are housed in the groove on the inside faces of the four sides of the chest.

Clamping blocks permit the pressure to be exerted behind the pins. This allows the pins to protrude 1/16". After the glue has cured and the clamps have been removed, sand this excess away, making the ends of the pins flush with the sides of the case.

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Shadow Box

White
Oak

MAKING THE SHADOW BOX

First, cut a 1/2" X 3/8" rabbet on the back inside edges of the two sides, into which the piece's back will later be fit. Cut through dovetails at each corner (see chapter twenty-five). After dry-fitting but before gluing the dovetails, cut the dadoes that will house the ends of the shelves on the inside faces of the two sides. When the shelves have been fit into the dadoes, glue and assemble the four sides of the case.

While the glue in the dovetail joints is curing, cut the dadoes in the two upper partitions and fit the partitions into them. Then glue and slide the partitions into place.

Below the half-circle at the top of the back, relieve the sides of the back so that they will fit into the rabbet cut into the back inside edges of the sides. Fasten the back in place with 3/4" no. 6 wood screws passing through the back, into the rabbet and into the back edges of the box's top and bottom. Then, sand and finish the shadow box.

MATERIALS LIST

A	Back	1 pc.	½×6⁵⁄₁₆×20⁵⁄₁₆
B	Side	2 pcs.	½×2×17⅜
C	Top and bottom	2 pcs.	½×1½×6⁵⁄₁₆
D	Shelf	3 pcs.	⅜×1½×5⁵⁄₁₆
E	Partition	2 pcs.	¼×1½×2⅛
F	Screws	10 pcs.	¾" no. 6

**These are net measurements. Surplus should be added to dovetailed parts to allow them to be sanded flush.*

INTERPRETING HARDWOOD GRADES

The grading system used to indicate the quality of individual hardwood boards can be a little intimidating. In an effort to clarify that system, I spoke with the National Hardwood Lumber Association.

First, the system *is* complicated. The training course offered by the National Hardwood Lumber Association for people interested in a career in lumber grading consists of fourteen weeks of "intensive" training.

Second, although there are only nine commonly used grades, there are any number of specialized or combination grades used in the woodworking industry. However, the good news is that there are only four grades with which the average cabinetmaker need to be concerned. These are FAS, Selects, #1 Common, and #2A common.

Third, the grades are distinguished by the precentage of clear wood that could be taken from a board in cuttings not smaller than those specified on the chart below. For example, to be graded FAS, a board must be able to yield 83 1/3 percent of its surface as clear wood when taken in cuttings not smaller than 4"X 5' or 3" X 7'. (The odd percentages reflect the convention of measuring lumber in board feet, a unit consisting of the amount of material contained in a cutting 12"X 12"X 1'.)

Fourth, all grades, with the exception of Selects, are determined from the poor face of the board. This means that if a woodworker buys a board graded FAS, its good face is likely to offer a higher percentage of clear surface than is indicated on the chart.

	FAS	SELECT	#1 COM	#2A COM
Minimum Size Board	6″×8′	4″×6′	3″×4′	3″×4′
Minimum Size Cuttings	4″×5′ 3″×7′	4″×5′ 3″×7′	4″×2′ 3″×3″	3″×2′
Minimum Clear Yield	83⅓%	83⅓%	66⅔%	50%

**Please note that this chart is not intended to be a complete representation of any of the grades shown. It's intended only to offer some general guidelines.*

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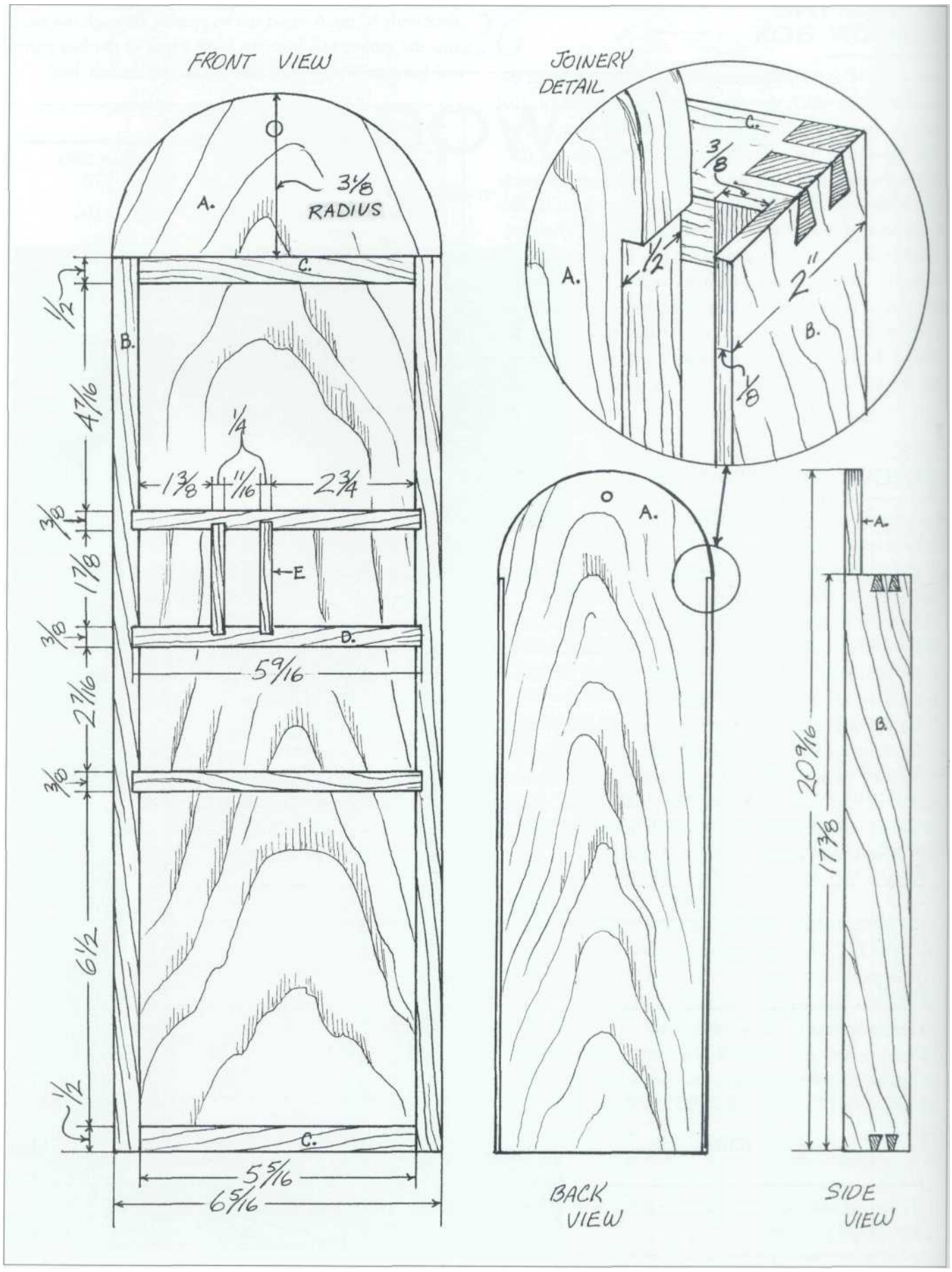

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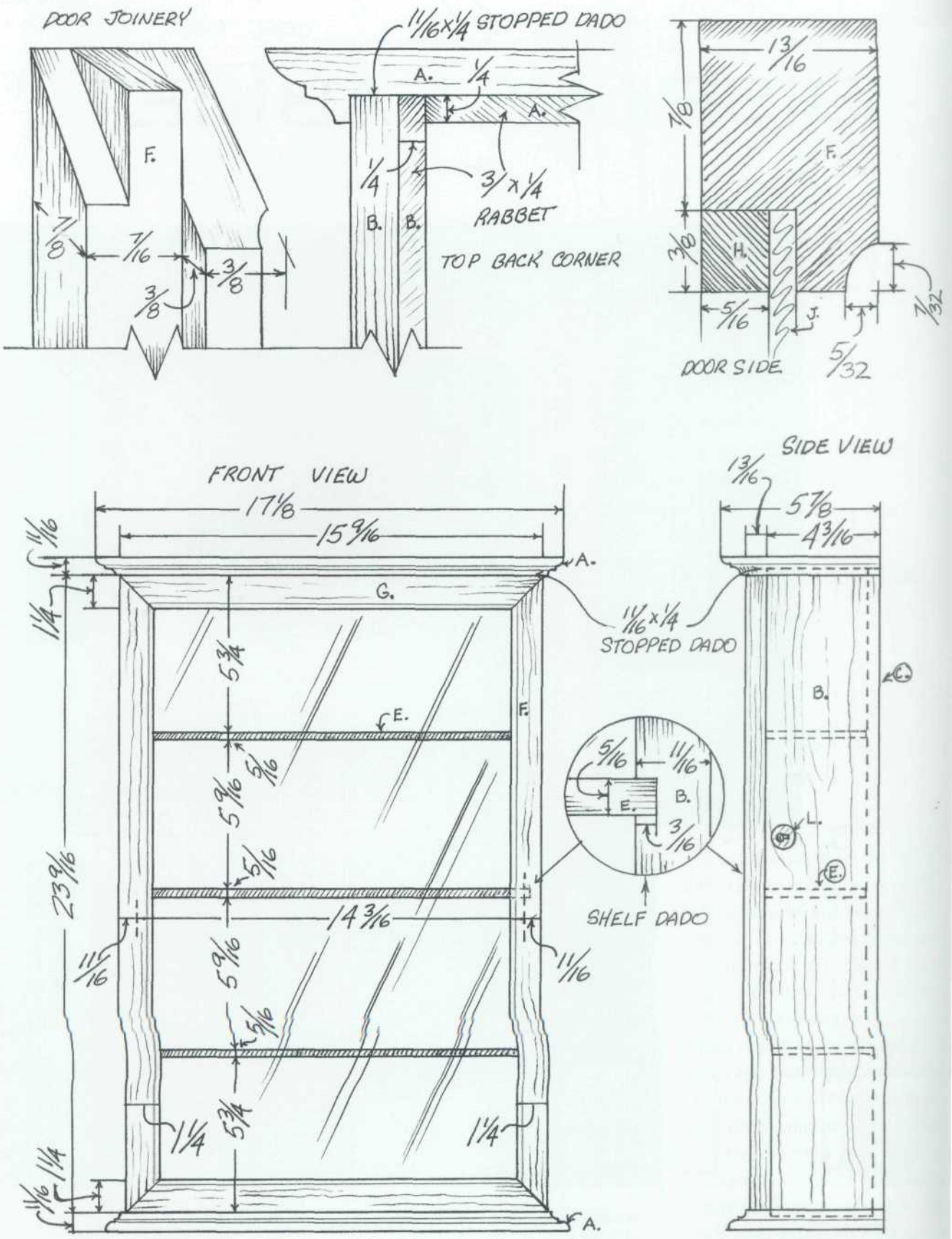
Display Cabinet

Cherry



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miter. This spline not only increases the glue surface; it also allows face grain to be glued to face grain. The feathered miter, used in the construction of the Shaker-style mirror, is another variation of the basic miter joint, one offering the same advantages as the splined miter. The mitered bridle joint used in the construction of the door on this cherry display cabinet is still another variation, one including tenons on the door's sides which fit into mortises cut into the miters on the door's top and bottom. This joint offers the strength of tenons which are an actual part of the door's sides. It does, however, provide less glue surface than either the splined or feathered miter joints.

MAKING THE DISPLAY CABINET

After milling the stock to the required thicknesses, lengths, and widths, form the moulded edge on the front and ends of the cabinet top and bottom. Then, cut 11/16" X 1/4" stopped dadoes on the top surface of the bottom and the bottom surface of the top (see chapter five). These dadoes will house the ends of the cabinet sides. Cut a 3/8" X 1/4″ rabbet across the back of the cabinet top and bottom connecting the dadoes. Cut the same rabbet on the back, inside edges of the cabinet sides. These four rabbets will house the perimeter of the cabinet back. Finally, cut three 3/16″ X 5/16" dadoes across the inside surface of the cabinet sides to house the ends of the shelves.

Then assemble the case with glue and screws passing down through the top into the sides, and up through the bottom into the sides. Screw the back to the cabinet sides, top, bottom and the backs of the shelves. These screws pass through oversized holes to allow the back to expand and contract in response to seasonal changes in humidity.

Begin door construction by running the moulded edge on the front inside corner of the frame stock. Cut a 3/8" X 7/16″ rabbet on the back inside edge. Then cut the mitered bridle joint. You can do this with a backsaw and a chisel or with a stack of dado cutters on the table saw, holding the work in a Universal Jig.

The glass is held in its rabbet with the four tack strips.

MATERIALS LIST

A	Top and bottom	2 pcs.	11/16 × 5 7/8 × 17 1/8
B	Side	2 pcs.	11/16 × 4 3/16 × 24 1/16
C	Back	1 pc.	3/8 × 14 13/16 × 24 1/16
D	Cleat	1 pc.	13/16 × 1 1/4 × 14 3/16
E	Shelf	3 pcs.	5/16 × 3 3/16 × 14 9/16
Door			
F	Door side	2 pcs.	13/16 × 1 1/4 × 23 9/16
G	Door top and bottom	2 pcs.	13/16 × 1 1/4 × 15 9/16
H	Vertical tack strip	2 pcs.	1/4 × 3/8 × 21 3/4
I	Horizontal tack strip	2 pcs.	1/4 × 3/8 × 12 15/16
J	Glass	1 pc.	1/8 × 13 3/4 × 21 3/4
Hardware			
K	Hinge	2 pcs.	1 × 1 3/4
L	Lock	1 pc.	1 5/8 × 1 7/8
M	Screws	various	

**These are net measurements. Surplus should be added to door sides to permit joints to be sanded flush.*

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SIX WOOD BOX

Mixed Woods

INSTALLING HARDWARE

Many years ago, I made a drop-leaf walnut wall desk with a number of variously sized pigeonholes. I remember the satisfaction I felt fitting each of the little dividers into its dadoes. I remember the pains I took to smooth the wood with a variety of sandpaper grits. I also remember visiting the hardware store in search of a lid support that would hold the drop leaf at the proper angle so that it could be used as a writing surface.

I found the brass support that I had envisioned for my desk and I took it home and tried to install it. I tried it one way and then another and another, each time making screw holes in my carefully sanded walnut, until I realized, with a growing sense of panic, that it simply wasn't going to work, that the arrangement of pigeonholes I'd designed left no room for the operation of this lid support.

I searched the mail order catalogs next (at that time, there weren't nearly as many to choose from). But nothing I found there looked any more likely to work in the tight confines of my desk than what I'd already tried.

Rule number one for makers of furniture and woodenware: *Buy the hardware first.* Buy it before construction starts, before a single stick of wood is cut, before even the finishing touches are put on the design. Buy the hardware first because what the project requires may not be available or, if available, may not work as envisioned.

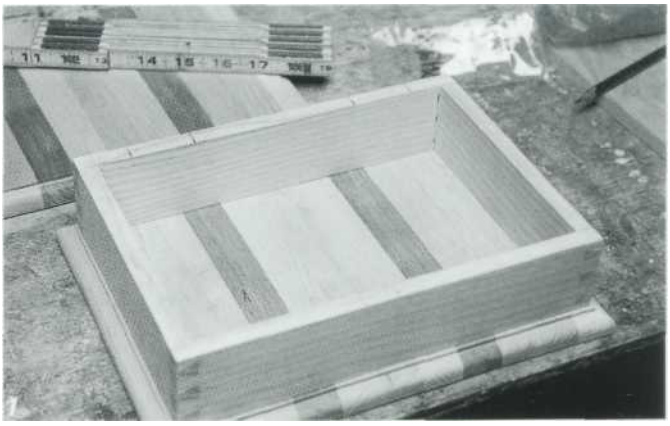
What happened to the wall desk? I did finish it, and we did use it in our home for several years. We, then, later gave it to a friend. Although I haven't seen it for ten or eleven years and have attempted to blot its memory from my mind, I believe that my solution to the problem of the drop leaf support involved a length of noisy and inelegant brass chain.

The opened six-wood box shows the lock installed in the front.

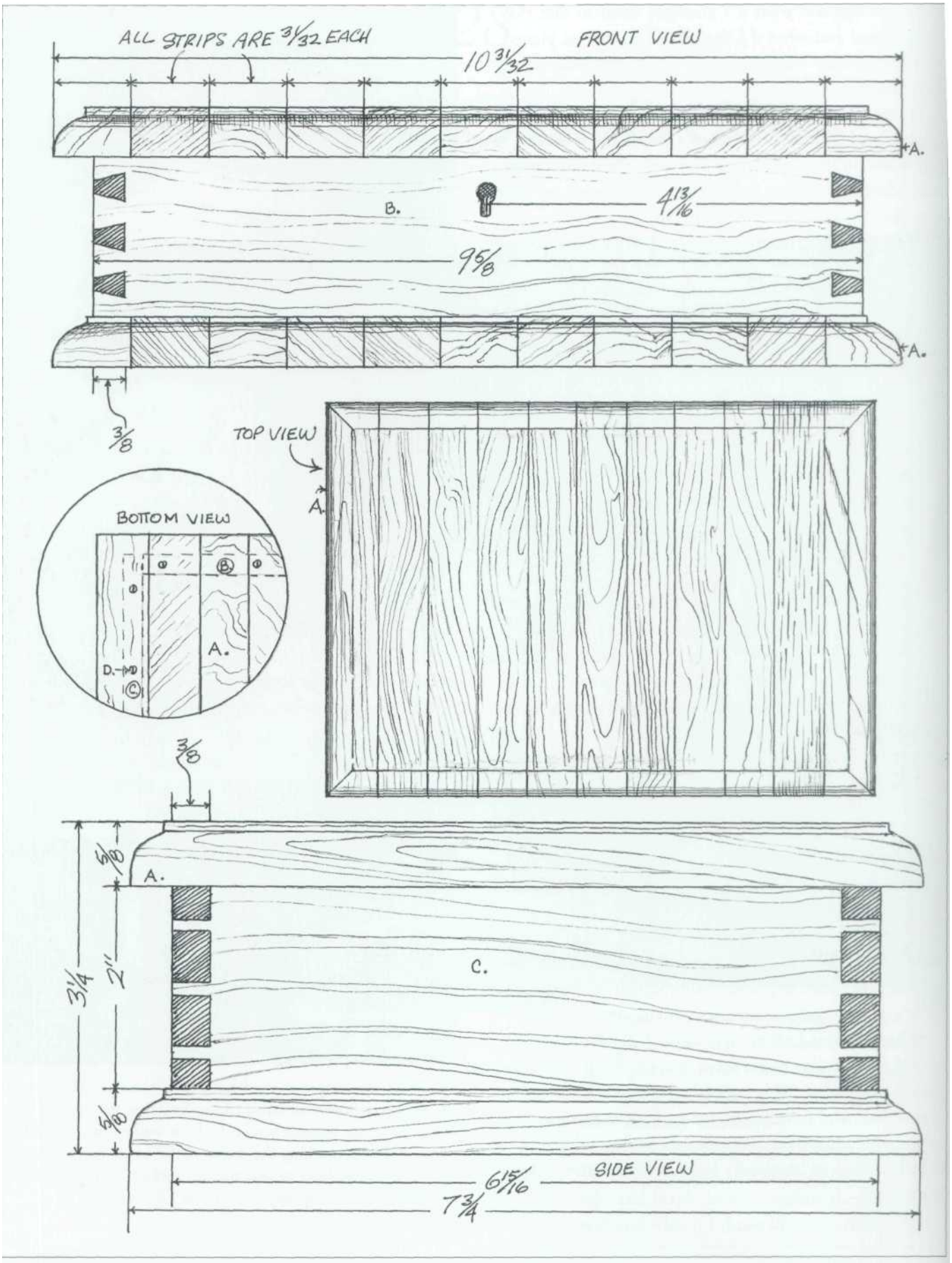
Before beginning work on this small box, I waited for my hardware to arrive.

Begin construction with the glued-up panel from which the top and bottom are cut. Shuffle around a number of rips approximately 1" wide until a pleasing arrangement is found. Then glue-up and clamp these rips. After the glue is cured, you can plane the panel (see chapter five) cut out the box's top and bottom, and mould them on a shaper or a table-mounted router.

Dimension and dovetail sidewall material together (see chapter twenty-five). Fasten the bottom in place with a number of screws passing through oversized holes that allow expansion and contraction of the bottom in response to seasonal changes in humidity.



1 Install the hinges on the back wall of the box. This process begins with careful layout. Lines marking the ends of the hinge leaves are squared across the back wall of the box. Then, additional lines marking the depth of the hinge mortises are drawn. Set these lines so that the top surfaces of the top leaves are flush with the top edge of the box's back wall.



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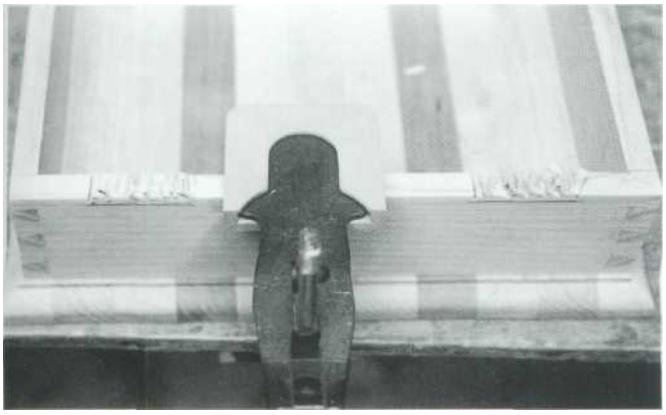
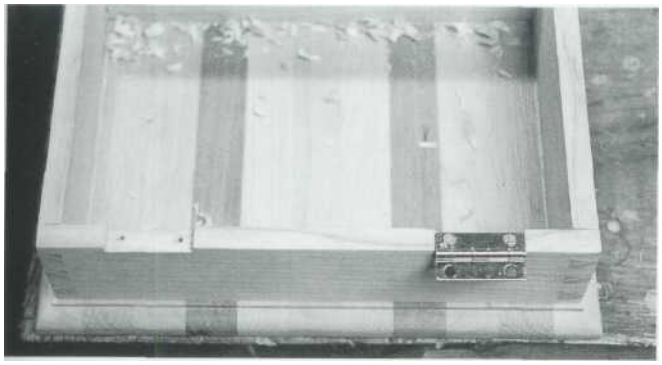
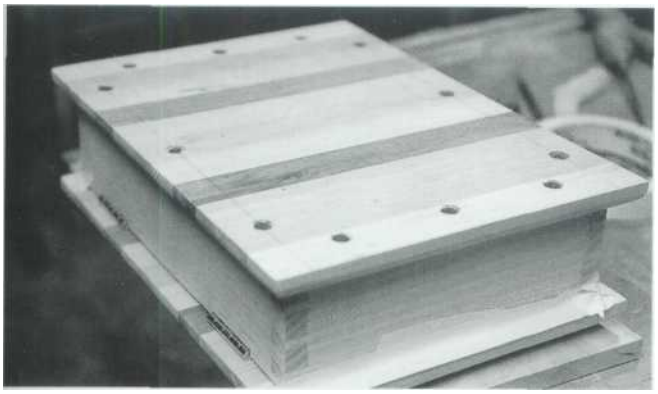


2 *A series of* ***shallow*** *chisel cuts lifts wood from the mortises. this will be removed by working the chisel back, from the* opposite direction.



3 After cutting the mortises, install the hinges. Take care to accurately align the hinges so that both hinge pins open on the same axis.

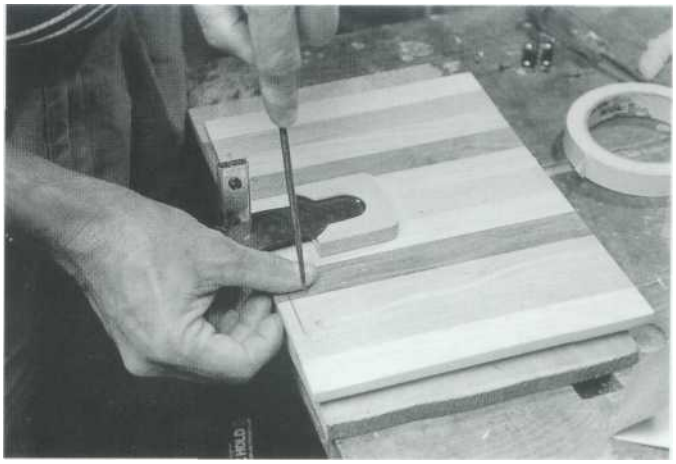


4 When the hinges have been fastened to the box's back wall, invert the box over the lid and tape in place. Then mark hinge locations very carefully.

MATERIALS LIST

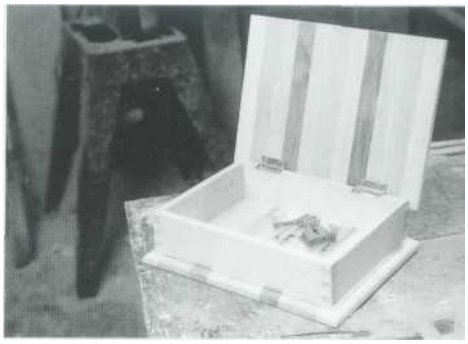
A	Top and bottom	2 pcs.	$\frac{5}{8} \times 7\frac{3}{4} \times 10\frac{31}{32}$
B	Front and back	2 pcs.	$\frac{3}{8} \times 2 \times 9\frac{5}{8}$
C	Side	2 pcs.	$\frac{3}{8} \times 2 \times 6\frac{15}{16}$
D	Screws	12 pcs.	1¼ no. 8
E	Hinge	2 pcs.	$1\frac{1}{2} \times \frac{7}{8}$
F	Box lock	1 pc.	$1\frac{1}{2} \times 1$

**Front, back and side length measurements are net. Surplus should be added so that dovetail can be sanded flush.*
**Hinges and lock were ordered from Constantine's Hardware.*
**Reading from left to right, the woods in the top are as follows: hard maple, white oak, cherry, walnut, sassafras, cherry, sassafras, walnut, cherry, white oak, hard maple. The box's walls are made of ash.*



5 Remove hinges from the back wall so they can be installed on the lid. Here, a scratch awl is being used to punch **a** starting hole for the drill bit in the center of the circle marking the screw holes in the hinges.

6 After installing the hinges on the lid, fasten the hinges' other leaves into the mortises previously cut into the box's back wall.



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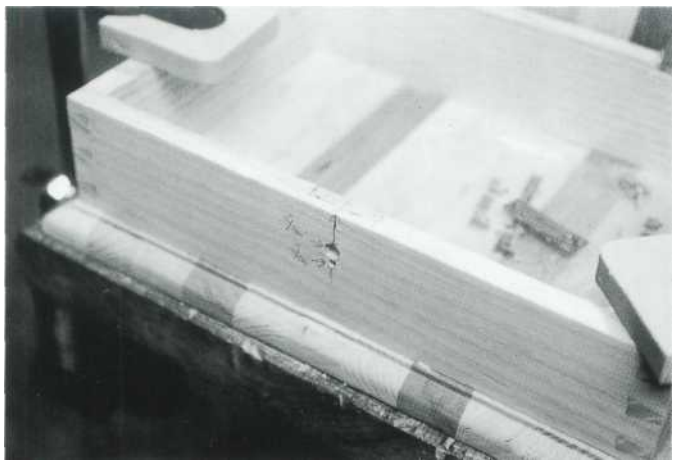
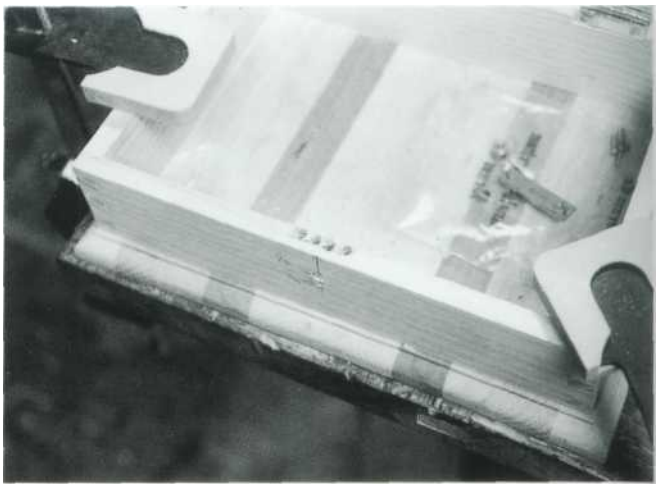


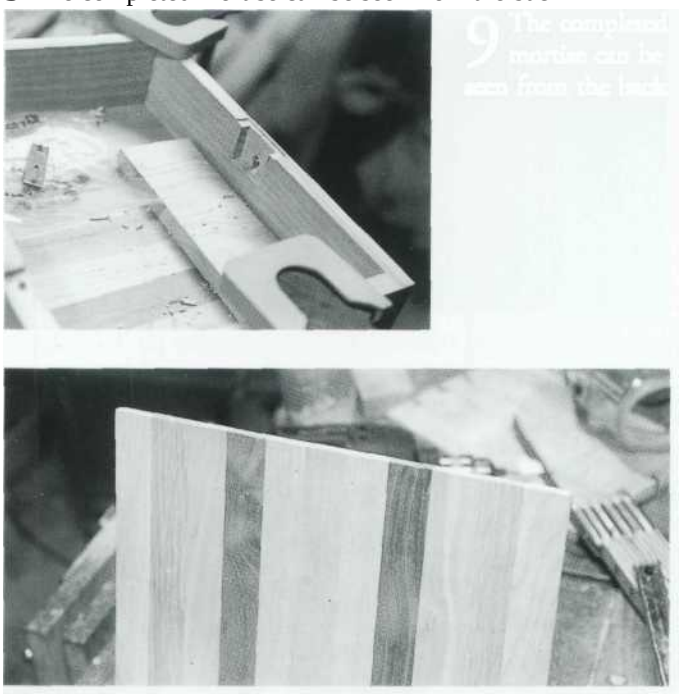
7 Next, install the brass box lock. Again, careful layout is essential. Square a centerline across the top edge of the box's front wall and draw the mortise for the lock on the top edge and inside face.

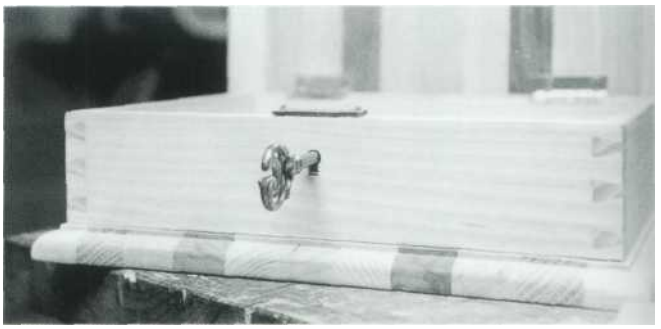
Then extend the centerline down the front face of the box's front wall, and lay out the keyhole along this line. Drill a 1/4″ hole above a 1/8" hole to remove most of the waste necessary for the creation of the keyhole.



8 Four 3/16" holes remove much of the waste for the mortise that will house the main body of the lock.

9 The completed mortise can be seen from the back

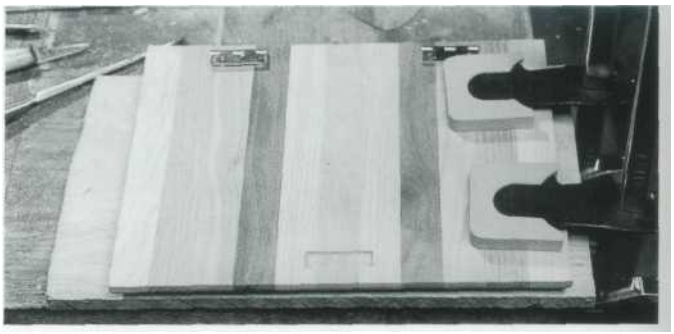




10 After installing the lock in the box's front wall, locate the strike plate on the bottom side of the lid. The fist step in that process is locking that strike plate in place with the key.

Here, the strike plate can be seen locked facedown. Notice the two bumps on the back side of the strike plate. When the lid is closed and tapped firmly, these two bumps leave depressions on the lid's bottom surface, locating the strike plate on the lid.

12 Cut the mortise in which the strike plate will sit. The lock is now fully functional.



11 In this photo, the two depressions can be seen near the upper edge of the lid. After the lid has been clamped face-down on the benchtop, position the strike plate so that the two bumps on its upper side are located in these depressions. Then draw a line around the strike plate and the mortise cut.

BENTWOOD BOX WITH SNAP-FIT LID

Walnut, Hard Maple

.

MAKING THE BENTWOOD BOX

Work begins with the construction of a bending form for the main body of the box. Mine consists of a stack of spruce 2 X 4's laminated together and band-sawn and sanded to the box's inside profile. On the side of the form that will shape the front of the box, the face of the form is undercut for the lap of material beneath the box's glue joint. A thin strip of metal (in my case, aluminum siding) is screwed to the form creating an opening into which the end of the sidewall material can be slipped as that material is wrapped around the form.

The next step is acquiring material for the sidewalls of the box (see chapter two for a detailed discussion).

After the sidewall material has been soaked (for twenty-four hours in cool water, followed by ten minutes in warm water), wrapped around the form, and clamped in place, it should dry for four or five days. At that time, remove it from the form and cut the lap joint. For this particular example, I drilled three holes in the joint, sandwiching in three bits of peacock feather between the lapping laminations so that the feather was visible through the holes. The joint is then glued and clamped using the bending form and the caul both to protect the material from the clamps and to preserve the box's oval shape while the glue cures. (this process is described in some detail in chapter two).

Cut out the clasps and the handle next. Thicknesses can vary, but the thickness of the clasps must be accurately transferred to the stock that will later become the lid so that the walls of the notches fit snugly against the clasps.

When you have selected the lid material, place the box's bentwood sidewalls on that material and draw a line around its circumference. Next, establish a centerline running from one end of the box to the other. This centerline is necessary in order to lay out the notches that will house the clasps.

Next, sketch the outside profile of the lid. There is considerable freedom in establishing this profile since the notch placements are the only critical locations on the lid. Then cut the lid's outside profile on the band saw.

Once the lid has been shaped, the handle is affixed. I taped the handle in place, turned the lid over, and drove a couple of wood screws up through the lid and into the handle.

Make the bottom next. After thicknessing the stock to *7/16"*, place the box's bentwood sidewalls on the bottom

MATERIALS LIST

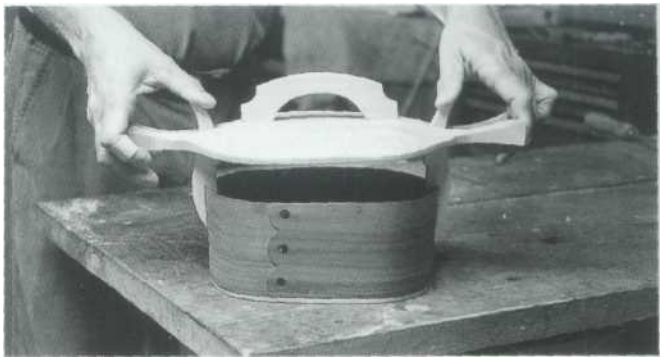
A	Top	1 pc.	1 × 7¼ × 15½
B	Sidewall	1 pc.	1/16 × 3½ × 30
C	Bottom	1 pc.	7/16 × 6¼ × 8½
D	Clasps	2 pcs.	½ × 1⅛ × 7¼
E	Handle	1 pc.	9/16 × 1¾ × 6⅛

**Measurements for lid, bottom and clasps must be taken from the dimensions of the sidewall, which are, in turn, determined by the size of the bending form.*

material. Profile the inside and outside of the sidewalls. On the band saw, cut the bottom profile, keeping the saw kerf approximately 1/16" outside the pencil line that marked the outside circumference of the sidewalls. Then, clamping the bottom in a vise, cut away the extra 1/16" of material with a block plane, to remove the saw marks.

Mark the rabbet around the bottom circumference with a line 5/16" from the top surface of the bottom. Next, with a dovetail saw, make a shallow cut along that line. This saw kerf represents the bottom of the rabbet. With a chisel, cut the rabbet to the depth marked by the line traced around the inside face of the sidewalls. Once the bottom has been fit, sand the parts and assemble the box using 1/8" wooden pegs to both fasten the walls to the bottom and the clasps to the walls.

OPENING THE BOX



1 Place your thumbs on the tops of the box's clasps while your fingers grasp the fishtail ends of the lid. Spread open the clasps and lift the lid. To close, press the lid down against the clasps until it snaps into place.

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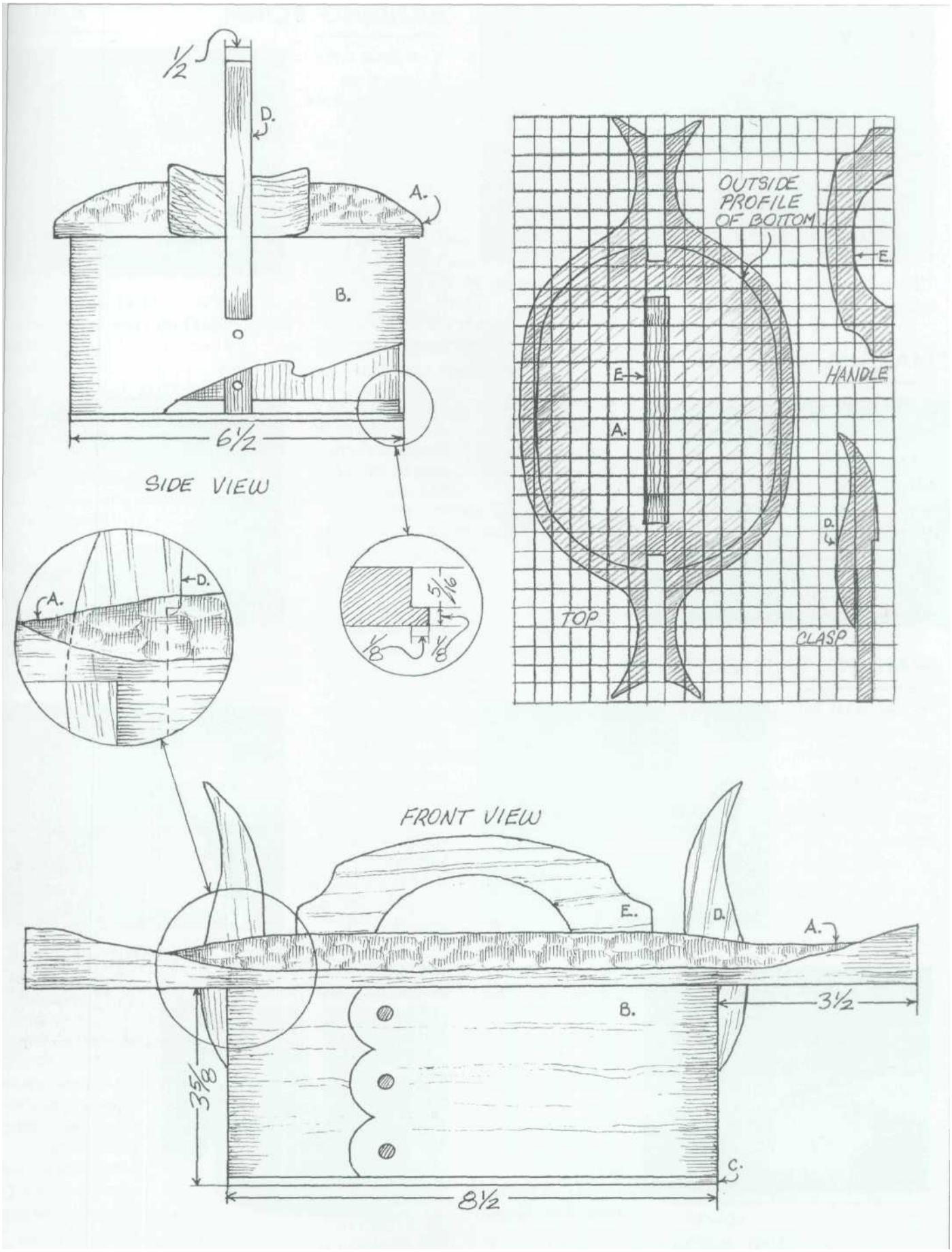
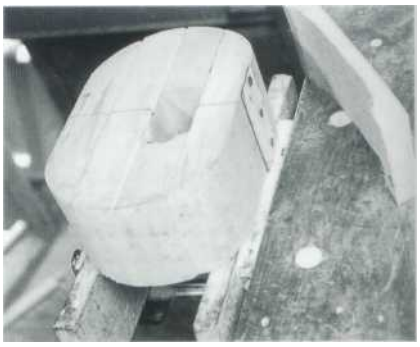

1/2
D.
A.
B.
6 1/2
SIDE VIEW
OUTSIDE PROFILE OF BOTTOM
E.
HANDLE
A.
D.
TOP
CLASP
5/16
1/8
1/8
FRONT VIEW
E.
D.
A.
B.
3 1/2
3 5/8
C.
8 1/2

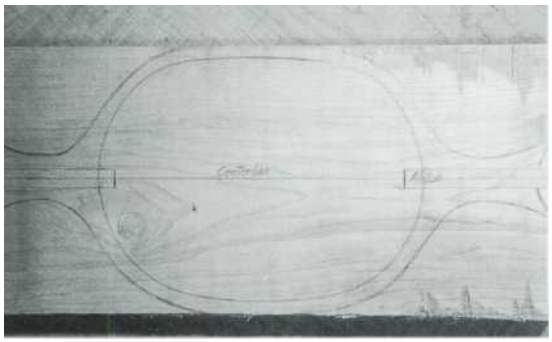
This close up of the box side reveals peacock feather inlay in the holes, a very unique design element.

BENDING FORM

1 A block at the base of the bending form allows a vise to hold it. After wrapping the soaked, resawn stock around the form, clamp the caul to the form to hold it in place. Cut an opening in the top of the form for the clamp head.

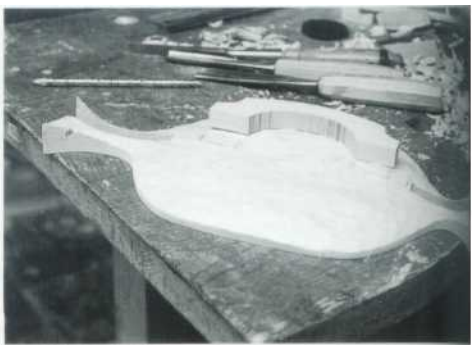


MAKING THE LID



1 The layout of the lid is shown. Careful planning at this stage will ensure a lid that snaps cleanly into place.

2 If the surface of the lid is to be shaped, flat surfaces must be left for the base of the handle.



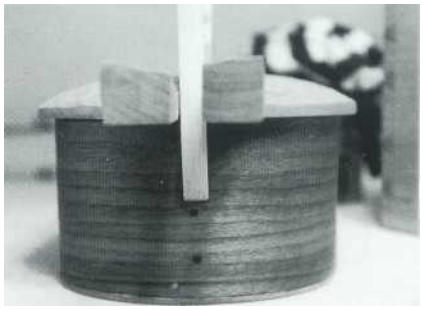
MAKING THE BOTTOM

1 Define the bottom of the rabbet that will receive the sidewalls by a shallow saw cut made all around the bottom.

2 Cut the rabbet with a chisel. Here, the chisel is cutting across end grain. After cutting another 3/4" of the rabbet, reverse the bottom in the vise in order to cut back to that point from the other side.

3 The various parts have been cut and fit and are ready for assembly. Notice the widened section of the rabbet which will receive the lapped section of the sidewalls. Notice, too, the notches for the bottoms of the clasps.

PEGS



1 This shows the ends of two pegs driven through the sidewall into the clasp. Below, to the left, is one of the pegs holding the bottom and sidewall together. Drill a hole before inserting these pegs.

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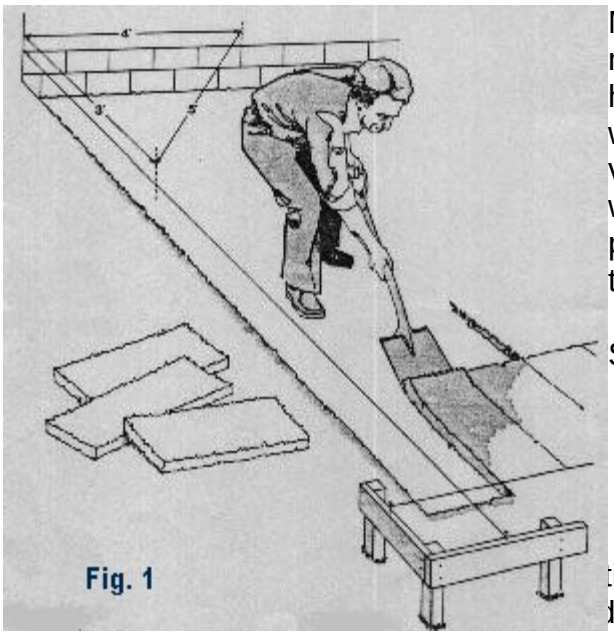
DECK

Step 1



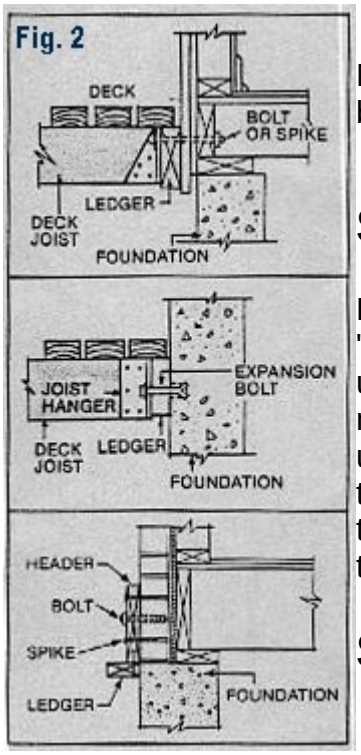
Mark off the deck area using string and "batterboards" making sure that it is square. Batterboards are boards hammered in to the ground just outside the corners of where the deck will be. See Fig 1. The string will help you visualize the size and appearance of the finished deck and will also serve as a guide for excavation and post placement. But trust me, it will always look smaller this way than when it is done.

SQUARING WITH STRING

1. Attach string to house and/or batterboards to make sure its level.
2. Use a felt tip marker to mark the string 3' from the corner in one direction and 4' from the corner in

tion.

diagonal connecting these 2 points is 5', you have a right triangle and the angle at the corner will be 90°.



Note: To obtain the 5' measurement, move the string attached to batter board to the left or right until correct.

Step 2

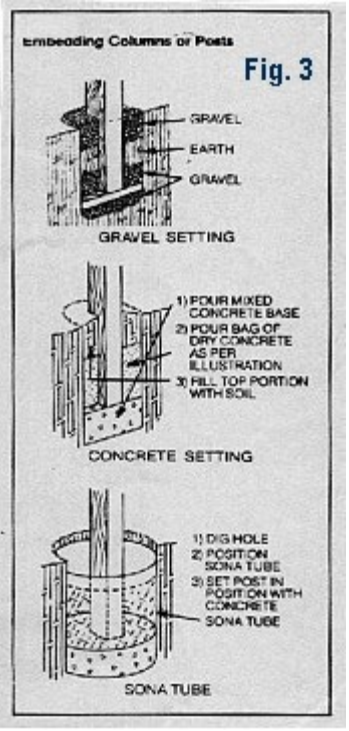
Prepare the site. With a spade or sod cutter, remove sod to a depth of 2 or 3 ". Uncover an area approximately 2 ft. larger than the planned deck. It's unlikely that grass would be able to grow in the shadow of your deck, so you might as well transfer the sod to a bare spot in your yard where it would be useful. To prevent weeds and unwanted vegetation from growing up through the deck, spread a sheet of polyethylene film over the area. You'll have to slit this to embed posts in the ground. After the posts have been installed, cover the sheet with gravel, pebbles or wood chips.

Step 3

the next step if you are attaching your deck to an existing structure.

The placement of the ledger/header determines the level of the deck floor, so be sure it is positioned at the correct height and is horizontal.

When fastening ledger/header boards to wood, the ledger should be held securely with bolts through the wall or lag screws. Use aluminum flashing to keep water from getting behind your ledger board.



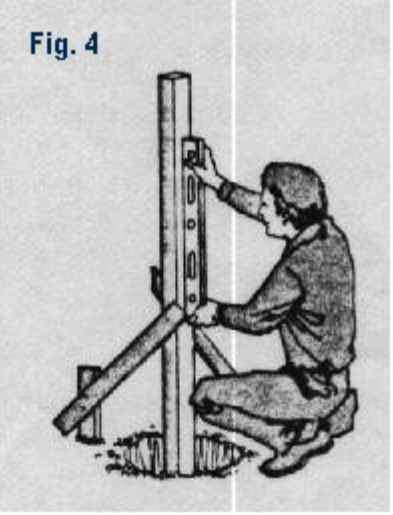
This should tuck up under your siding and bend down over the ledger, then down the face of the ledger board. Where aluminum or vinyl siding is in place, carefully cut siding away from house so that ledger/header board can be secured directly to the house. You may be able to use the bottom edge pieces of the siding above the deck to refinsh the lower edge, so save these if possible. See figure 2. I will assume the joists are hung from the ledger and not resting on it, but be sure you account for the height of your deck boards when figuring the placement of the ledger. (Typically just 1 ½ inches down from the final height of the deck.)

Step 4

Locate and dig holes for footings. In normal soil the holes should be a minimum of 24 to 36 inches deep, although the actual depth will depend on the height of the column and the depth of the frost line. Posts should go deeper than the frost line to avoid heaving during freeze and thaw cycles. Again, this is usually specified by code when the deck is attached to the house.

If you have many holes to dig and/or have difficult soil to dig in, you should rent a power posthole digger. These can be operated by one person, and certainly make the digging go MUCH faster.

You can use pressure treated wood in the ground for your footings as follows. Fill the bottom of the hole with 6 inches of gravel and place a wood footer plate (2" x 6", or 2" x 8" cut off) on top of the gravel. Upright posts can then be positioned on this base (Fig. 3). Fill the posthole with alternating layers of 4 to 5 inched of gravel and earth. Tamp each layer until the hole is filled and post is plumb and solid. If concrete collars are used, taper the tops downward and away from the post for drainage. Posts can also be set in concrete. Or my preferred method, uses a cement footing to just above the ground level. Fill the post hole completely with cement and use a section of "sono tube" (a heavy cardboard tube, 8 inches in diameter) to finish off the hole at ground level. Make sure you have already purchased the hardware to attach the posts to the cement so you can set the bolts in the cement while it is wet.



When setting the posts directly in the holes, make sure they are plumb and in alignment with one another. Use a carpenter's level to check for vertical alignment (Fig. 4).

One advantage of using the cement footings and the wood attached to them above ground, is the leveling and exact location can be set later, when the beams are positioned. It allows for some adjusting later (a little, but that is all you are usually looking for.)

Step 5

Secure beams to posts. Using a string and level, find the desired deck floor height on the posts. Or extend a long straight 2 by 4 from the ledger board to the posts and placing a level on the board, determine the post height. By subtracting the thickness of the joist (use the actual dimension not the nominal one), you will have determined the correct height for securing the top of the beam to the post. Carefully mark all 4 sides of the posts. Beams can rest on top of the post, or be fastened to the side. You may cut all posts except those serving as railing supports at this time. Fasten the beam to the post, keeping post and beam flush. Or set the beam atop the post nailing it down to the post.

Step 6

Attach joists. Joists are attached to the house with joist hangers and/or supported by a ledger board. Joists are placed on 16" or 24" centers, and attached to the beams and ribbon joist. Joists can be attached to the beams using joist hangers, or rest on the beam. If the joists are to extend over a beam, do not extend them more than 1/3 of their length.

Step 7

Install deck boards using hot-dipped zinc-coated 16-penny nails.

Seperate boards using a small finishing nail as a spacer or set boards right up against each other. If pressure treated wood came dry, a space would be necessary for some expansion may take place when it gets wet. However, it typically is quite wet and will always shrink. I have found that when placed tight against each other they will shrink leaving an adequate gap. If you leave to large a gap while they are still wet, the gap may get quite large .

Your deck surface is an important part of your project, and the most visible. Make it simple with the boards set to end on the joists. If you could not get decking long enough to span your deck, stagger the butt end joints so they do not all end along the same joist.

You can trim your deck after nailing to assure a straight line (see Fig. 5). Do not allow an overhang exceeding 1 ½". For a more finished appearance, cut boards flush to the joist and add a fascia board.

If a board is slightly humped, install it with the bark side up when possible to minimize cupping. The weight of people and objects on the deck, and of the board itself, will tend to flatten it. A curved board can also be used; use a board to pry it to the desired position and nail securely.

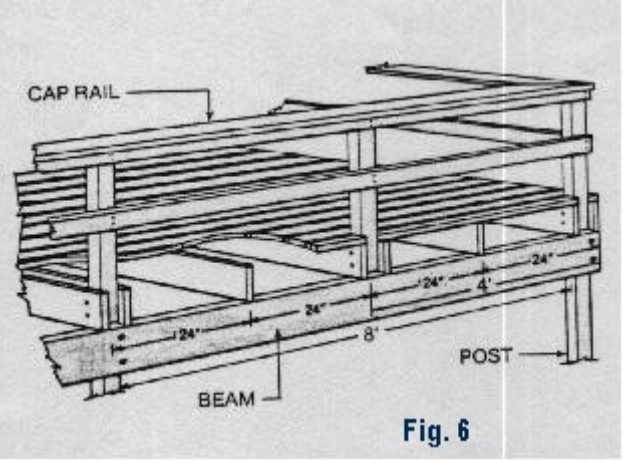


Fig. 6

Step 8

Install posts for railing. These can be a continuation of the posts which support the deck, or railing posts may be bolted to the outside joist or joist extensions.

Notice in Fig. 6 how the main posts continue up from the actual deck floor level and by doing so provide a good sturdy post. Intermittent posts or spacer posts can by used between the main support posts. The top railing member can be easily nailed to the side of the main posts at desired height. Posts can then be cut off. Spacer post height can be determined and added for additional support and appearance. Railing cap of suitable size can now be added as well as additional rails. More railing ideas are illustrated below.

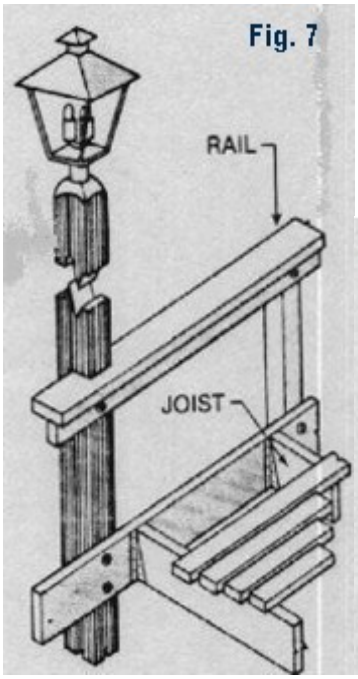


Fig. 7

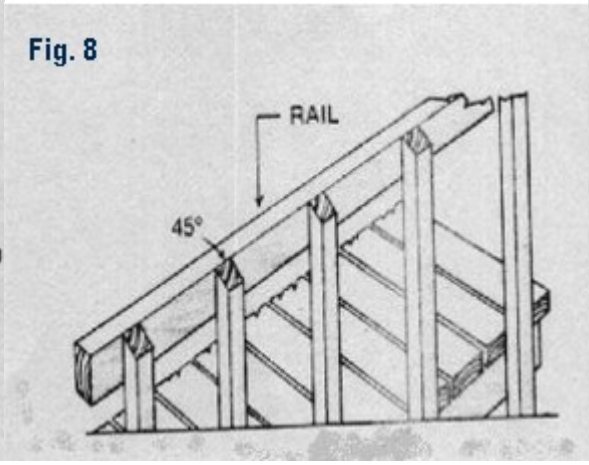


Fig. 8

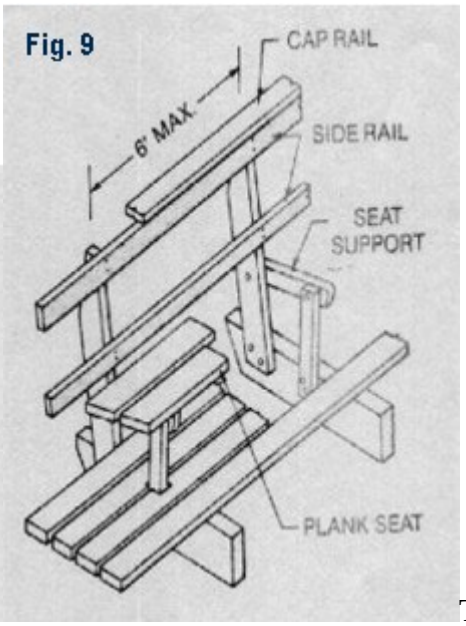
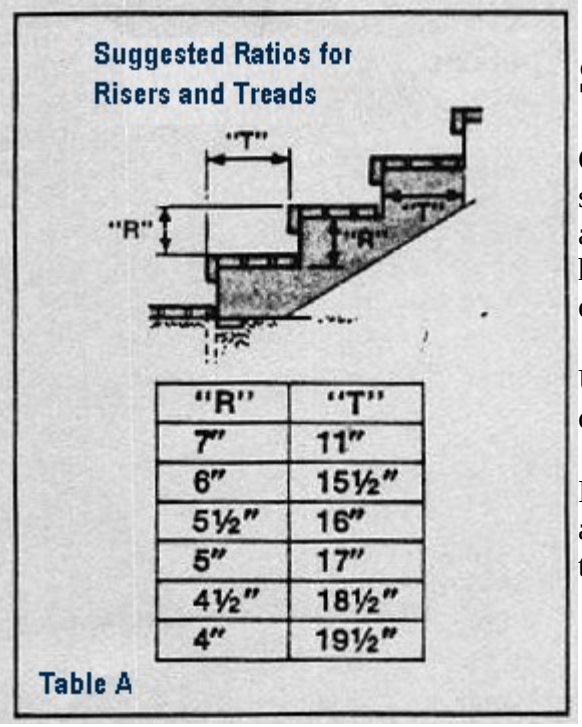


Fig. 9

The safety and beauty of your deck are enhanced by its railings. They can be plain or very elaborate, offering as much opportunity for individual preference as a fence.

Benches can be integrated into the railing on one or all sides. Bench seats should be at least 15" wide and 15" to 18" above the deck floor.

Privacy screens can enhance the beauty of your deck, as well as offering you privacy. They can also be used effectively under an elevated deck to create a storage facility or hide an unsightly hillside.



"R"	"T"
7"	11"
6"	15½"
5½"	16"
5"	17"
4½"	18½"
4"	19½"

Table A

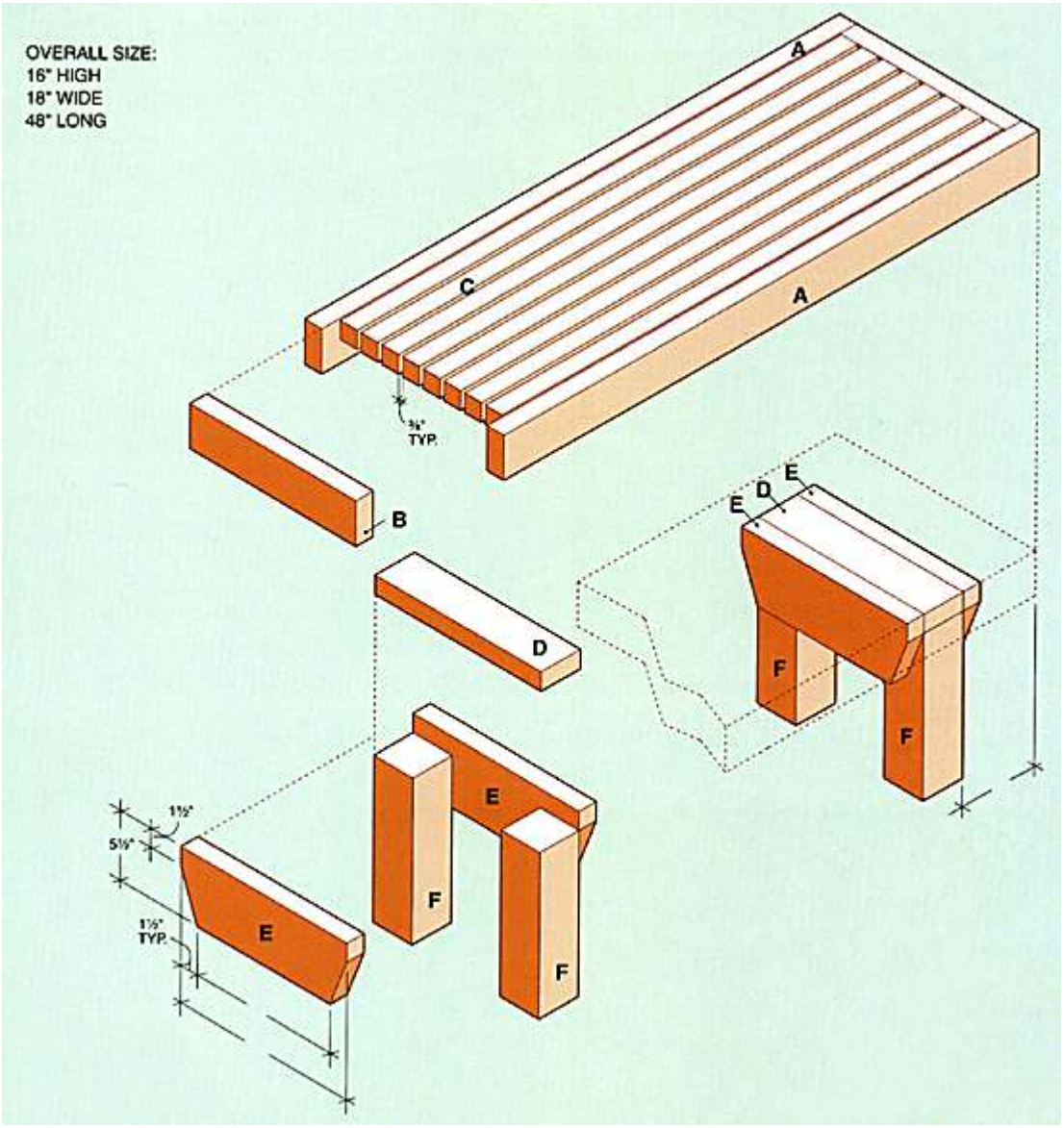
Step 9

Construct steps. Measure the vertical rise and decide upon the best riser size for each step. This will determine the number of steps needed. The adjecent table shows some recommended ratios of tread length and riser height. Multiply the number of steps by the tread length to find the overall run of the stairs.

Using 2 x 4 or 2 x 6 boards for treads will reduce cupping problems common with wider boards.

It is also possible to purchase precut steps at certain lumberyards. A call ahead might eliminate some of the more difficult angle cutting you need to do.

DECK BENCH


OVERALL SIZE:
16" HIGH
18" WIDE
48" LONG
A
C
A
3/8"
TYP.
B
D
E
D
E
F
F
E
F
F
1½"
5½"
1½"
TYP.
E

Due to its modular design, this bench can be mixed or matched with planters or other benches. Cedar wood enables this bench to withstand sun, rain, and even snow. This bench will enhance your enjoyment of your deck and its beauty.

Everything You Need:
Materials: 3" gold-colored deck screws (60) 2 1/2" gold-colored deck screws (16)

Directions: Deck Bench

CONSTRUCTION MATERIALS	
Quantity	**Lumber**
1	2 × 4" × 8' cedar
1	2 × 4" × 6' cedar
4	2 × 2" × 8' cedar
1	2 × 6" × 6' cedar
1	4 × 4" × 6' cedar

Cutting List				
Key	**Part**	**Dimensions**	**Pcs.**	**Material**
A	Sides	1 1/2 × 3 1/2 × 48"	2	Cedar
B	Ends	1 1/2 × 3 1/2 × 15"	2	Cedar
C	Slats	1 1/2 × 1 1/2 × 45"	8	Cedar
D	Stretchers	1 1/2 × 3 1/2 × 15"	2	Cedar
E	Braces	1 1/2 × 5 1/2 × 15"	4	Cedar
F	Legs	3 1/2 × 3 1/2 × 13"	4	Cedar

Note: Measurements reflect the actual thickness of dimensional lumber.

MAKE THE FRAME.

The butt joints make this bench sturdy and easy to construct. For strength and good looks, we used gold-colored deck screws.

1. Measure, mark and cut the sides (A) and ends (B) to length, using a circular saw.

2. Position the ends between the sides so the edges are flush. Measure from corner to corner. When the diagonals are equal the frame is square.

3. Drill 1/8" pilot holes through the sides and into the ends. Fasten the sides to the ends by driving 3" gold-colored screws through the pilot holes.

BUILD THE SEAT.

The slats that make up the seat are spaced 3/8" apart to allow rain water to run off.

1. Cut the slats (C) to length using a circular saw.

2. Set the frame on a flat surface and place 3/8" spacers against one side. Place the first slat in the frame against the spacers. Drill 1/8" pilot holes through both ends into the slat. Secure the slat to the ends with 3" deck screws. Repeat this process of positioning and attaching slats until all the slats are in place **(photo A).**

3. Measure, mark and cut the stretchers (D) to length.

4. To mark the stretcher outlines, measure in 5" and 3 1/2" from the inside of each end piece on the back of the slats and make a mark.

5. Position the stretchers between the marks. Drill 1/8" pilot holes through the stretchers into the slats. Attach the stretchers with 2 1/2" screws **(photo B).**

ASSEMBLE THE BENCH.

The braces hold the legs in place against the stretchers.

1. Measure, mark and cut the braces (E) to length.

2. To shape the ends of each brace, mark the angle by measuring down 1 1/2 " from the top edge and 1 1/2" along the bottom edge. Draw a line between the two end points and cut along that line **(photo C).** Repeat this step at the other end of the brace.

3. On each brace, measure down 3/4" from the top edge and draw a reference line across the stretcher for the screw positions. Drill 1/8" pilot holes along the reference line. Position a brace on each side of the stretchers and fasten it with 3" screws driven through the braces and into the stretchers.

4. Measure, mark and cut the legs (F) to length, using a circular saw. If needed, finish any cuts with a handsaw.

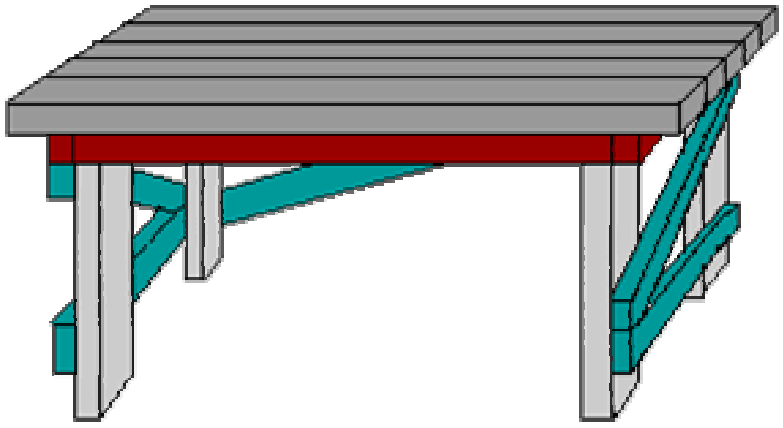
5. Position each leg between the braces and against the sides of the bench frame. Drill pilot holes through each brace and attach the leg to the braces by driving 3" screws through the braces and into the leg. Repeat the process for each leg until all legs are installed **(photo D).**

APPLY THE FINISHING TOUCHES.

1. Sand all surfaces with 150-grit sandpaper. Be sure to sand edges thoroughly so bare legs will not be scratched.

2. Because cedar is naturally resistant to decay, it will age to a natural gray. To preserve its reddish color, you can apply a clear sealer as we did. Cedar is also suitable for painting.

WORK BENCH

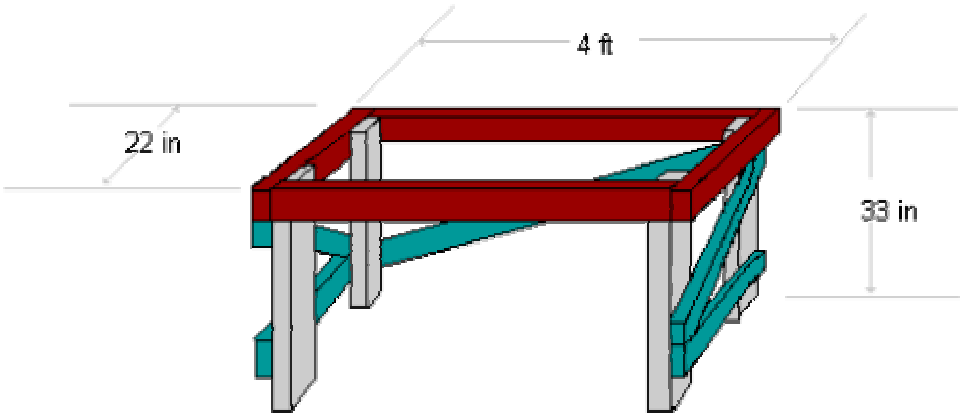


These plans are for a simple workbench you would build for your garage or along the wall in your shop. It is a sturdy bench, built simply, but to last as long as the structure you put it in.

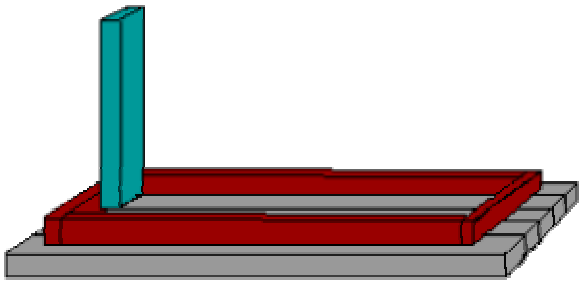
I used 2x6 boards for the top and the legs. The braces and frame can be 2x4's. You can also use 2x4's for the top.

The length should be dictated by your location. If the bench will be longer than 8 feet, you should build another set of legs under the center. The height should be about 34 inches high. But depending on your height you may want that higher or lower. A good rule of thumb is to stand with your arm straight down and your palm parallel to the floor. Measure the distance from the floor to your palm and build it that high. The width should be about 27-28 inches, which equates to 5 2/6's or 8 2x4's.

I have listed the dimensions and bill of materials for a bench 5 feet long, 27 ½ wide and 34 ½ high.



Start by nailing the bench's top boards to the two boards that run perpendicular underneath using 16d nails. The boards for our example size are five 2x6's 5 ft. long. Squeeze the top boards together as tight as you can, since little items will be finding their way through any cracks for years afterwards. The boards that will run underneath are 2x4's 22 in. long and should be set in from the edge 6". Flip the top over and nail the front and back frame boards to the end boards. These are 2x4's, 3' 9" long and go between the two nailed to the top.



Next nail the legs into the 4 corners of the frame under the bench. The legs are 2x6's cut 33 in. long. Nail the long 2x4 diagonal board that runs along the back of the bench to the two back legs. Turn the bench back right side up and nail in the stretchers that join the legs on both sides and the two diagonal boards on either side. These four boards are 2x4's.

You can make a shelf underneath by running boards from one side to the other supported by the stretchers between the legs. You may also wish to add a backsplash board to keep things from falls behind the bench. Nail a 2x4 to the top of the bench along the length of the back.

Bill of Materials:

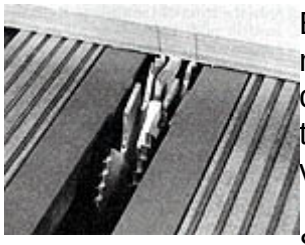
3 (three) 10 foot 2x6 (cut two of them in half for the top and one in 3 pieces for 3 of the legs)
1 (one) 8 foot 2x6 (cut the remaining leg and remaining top board from this one)
3 (three) 8 foot 2x4

BOOKCASE

1. **Cut the plywood to size.** Begin by ripping the plywood lengthwise into strips 15 3/4" wide. The extension table on the Mark V helps support the heavy plywood for these long cuts, yet even with this support, you should enlist the assistance of a helper or use a roller stand and rear support table.

   After ripping the plywood, crosscut it to length. Follow the cutting instructions in the list of materials.

2. **Cut the dados.** Mark the position of your dados on the sides (A, O). All of your dados will be 3/4" wide and one-half the thickness of the plywood, or 3/8" deep, with some exceptions on the top (B) and shelf divider (J).

   Be sure the machine is unplugged for your set-up. Carefully line up the marks you made on the edge of the plywood with the Dado Blade. Then crosscut your dados with one edge flat against your miter gauge. This is a tricky procedure because furniture-grade oak plywood has a very thin veneer on the outside that is susceptible to splitting if it is not cut properly.

   Set your speed dial to "R". Make a cut that is only as deep as the veneer thickness on the plywood. Then lower the table to final depth and make a second cut at the same place. The Stop Collars (from the lathe Tailstock) mounted on the table posts will set the final Dado depth of cut.

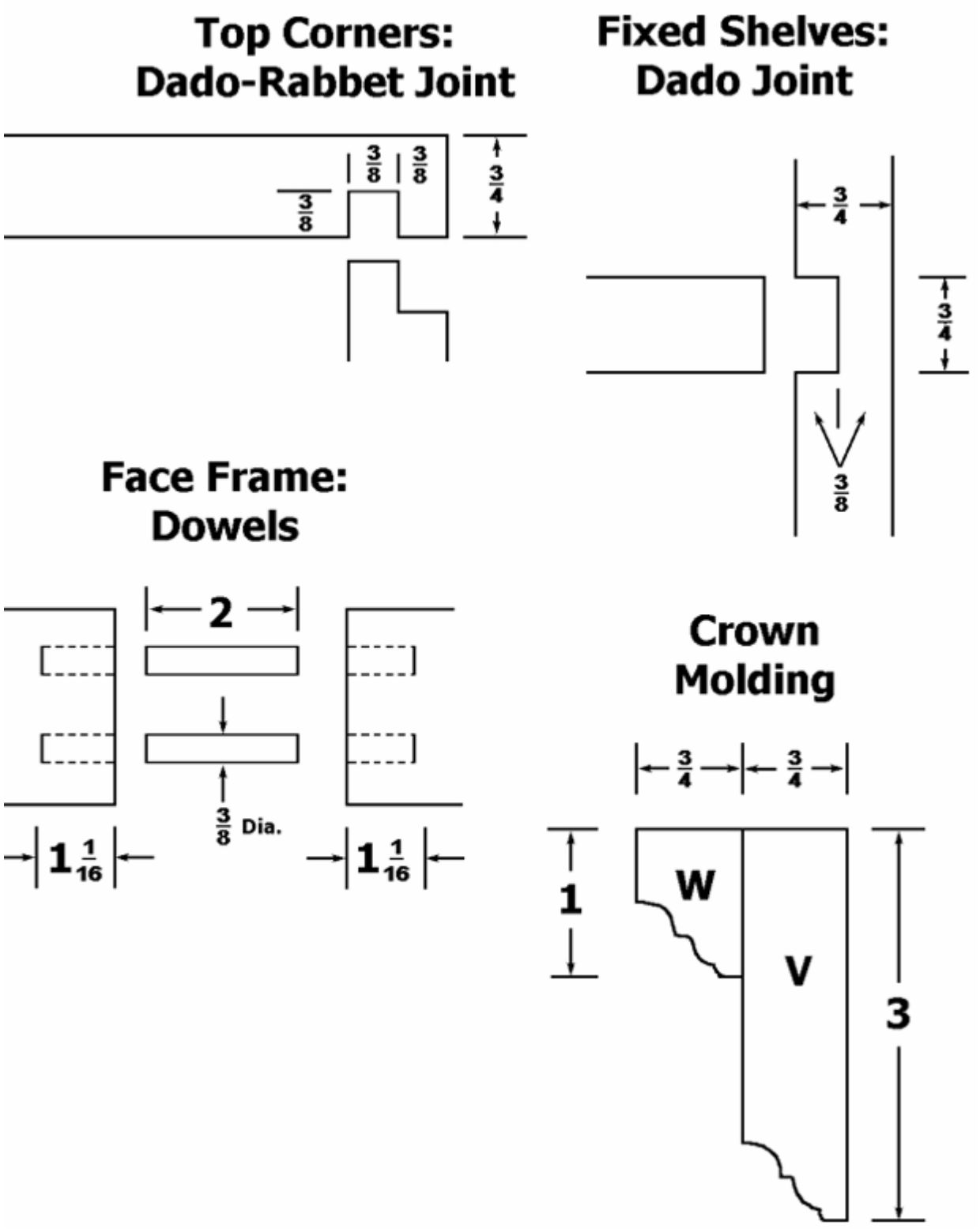
   The large table system on the Mark V 510 allows you to crosscut or Dado wide pieces with ease. If you are working with the Mark V Model 500, use the Front Table Extension to help support wide pieces as you crosscut and Dado. The Rear Support Table, Roller Stands, a Miter Gauge Extension or a Cross-Cut Sliding table will also help provide additional stability.

   Now mark and cut the other dados on shelf divider (K), and fixed shelves (G, N).

   Mark the dados on shelf divider (J). The dados on the button will be on both sides of the piece, so mark them just 1/4" deep.

   Mark the Dado in the center of the top (B), but not the ones on the ends. Cut these dados.

3. **Other dados and rabbets.** Now that you have completed all the 3/4" dados, change the width of your blade to 3/8". As you can see from the illustration of this Dado-Rabbet joint, the dados on the ends of the top (B) are 3/8" wide, 3/8" deep, and 3/8" from the end of the board. Mark and cut these dados.



The L-shaped cuts on the top of sides (A, O) are rabbets. Use the same 3/8" adjustment on your Dado blade to cut them 3/8" deep right on the ends of the boards. Notice that these cuts are on the opposite side of the previously cut dados (A, O).

4. **Drillholes for brackets.** Brown plastic shelf brackets are used here for the adjustable shelves. They are available in hardware stores and fit in 1/4" holes. Mark and drill you holes in the right side (O), and shelf dividers (J, K). These holes are set in two inches from the front and back, at 2" intervals up and down.

5. **Finishing.** At this stage, the finish is applied to the plywood. The reason for finishing the unassembled boards is so you can work on them while they lie flat and so the finish will not run.

   Put masking tape on the ends of the boards that will be housed inside dados. The joints will glue together better on bare wood.

6. **Glue up the carcass.** For this, you will definitely require the help of an assistant to provide extra hands while you assemble the awkward pieces. Yellow wood glue is used.

Assemble the bookcase dry first to be sure all the pieces fit. Set your clamps and check for square. Then re-assemble it with glue.

Leave out your adjustable shelves (F, H, M) and TV shelf (P) during the glue up.

7. **Begin the face frame.** Cut the left side (Q); right side (R), top (S), and bottom (T). Do not cut the narrower, 3/4" molding strips at this time. As you rip the long 96" pieces, use a helper or roller stand to hold them level during the cuts.
8. **Joint the edges.** Run the edges of your face frame pieces over the Jointer to square them up and smooth them out. This will you give a much smoother edge than you get from the table saw.
9. **Drill dowel holes.** Set up your Mark V for the horizontal-boring mode. Drill 3/8" holes in the top and bottom edges of the long, 96" side pieces (Q, R). Each joint will have two dowels. Measure the spacing on them so they will fit into the ends of the 3" bottom piece (T) and the 4" top piece (S). Drill the holes as shown in illustration.

10. **Match the dowel positions.** Place 2 3/8" dowel centers into the holes at the bottom edge of side piece (Q). With a try square or a combination square, line up the bottom piece (T). Push it against the dowel centers and tap it with a mallet to mark the exact centers of your dowel holes. Then cut corresponding dowel holes in the end of your bottom piece. Repeat this process for each end of your top (S) & bottom piece (T).

    NOTE: If you prefer, biscuit joints the Biscuit Joiner Attachment could be substituted for the dowel joints suggested here.

11. **Glue up the outer frame.** Glue the 3/8" dowels and edges of the outer frame pieces where they will join. Clamp them together and allow the glue to dry.
12. **Finish the frame.** Follow the same procedures you followed earlier. Finish all additional pieces similarly just prior to assembling them.
13. **Attach the face frame.** Use glue and small finishing nails (2" long) and attach the outer face frame to the carcass. Drill pilot holes into the frame so that the solid oak will not split.
14. **Shape the molding.** Use the Shopsmith Shaper Package your Mark V with a 1/2" Bead & Quarter Round Cutter. Round the edge of a long piece of oak with the Quarter Round side of the cutter. Then turn the piece over and round the other corner of the same edge.

After you have completed shaping the edge, rip it on the table saw so that it is 3/4" wide. You now have half-round molding. Shape and cut enough molding strips to face all of your shelves and shelf dividers, and both the front and sides of the TV shelf (P).

The secret to shaping is to take shallow cuts, follow all the safety guidelines, and experiment with some scrap wood to test the results. Shaping is also mch easier with the DC3300 Dust Collection System, which disposes of the chips just as they are being made.

15. **Size the molding.** Measure the shelf lengths after the outer frame is attached and cut your 3/4" molding strips to length.

    Chamfer the ends of the molding. Set up your disc sander and tilt the table to 45°. Lay a molding strip upside down against your miter gauge and chamfer the end to add a little accent if you wish.

    Since the TV shelf (P) will have molding on the sides as well as the front, the ends of the molding will have to be beveled at 45° to "frame" the shelf on the front corners. Do not chamfer the ends of the TV shelf molding.

16. **Attach the molding.** After applying the finish to the molding, nail the molding onto the front of the shelves. Remember to drill pilot holes. Inset all of your finishing nails with a punch. Then cover the holes with wood patch that is mixed with stain.
17. **TV shelf hardware.** A combination shelf slide and lazy-susan called a "TV Extension Slide" will hold your TV shelf (P), and eventually your TV set. Attach the slide to the TV shelf (P) and fixed shelf (N) with #8 3/4" screws.
18. **Crown Molding**

    With your shaper, you can create a crown molding effect. This effect is achieved by shaping the edge of a wide piece of oak with the Cove & Bead Cutter.

    Then flip the piece over and shape a corner on the opposite edge. After the piece is shaped, rip one side on your table saw 3" wide and the other side 1" wide.
    (The ripping is done after the shaping because shaping is safer with wide pieces.)

    Repeat this process so that you will have two 3" wide and two 1" wide molding strips, each 48" long.

    All of the molding pieces must be measured precisely and cut with 45° bevels on the front corners. To avoid mistakes, we suggest clamping each piece in place at the top of the bookcase and checking precisely where the bevel cuts should go. Glue up each 3" and 1" molding combination together. Line up the beveled edges, and then clamp them while the glue dries.

    Clamp each 1" and 3" molding combination to the top of the bookcase. Line up the corners carefully. Then drill pilot holes from the inside of the bookcase and screw in #8 1 1/4" screws to secure the crown molding.

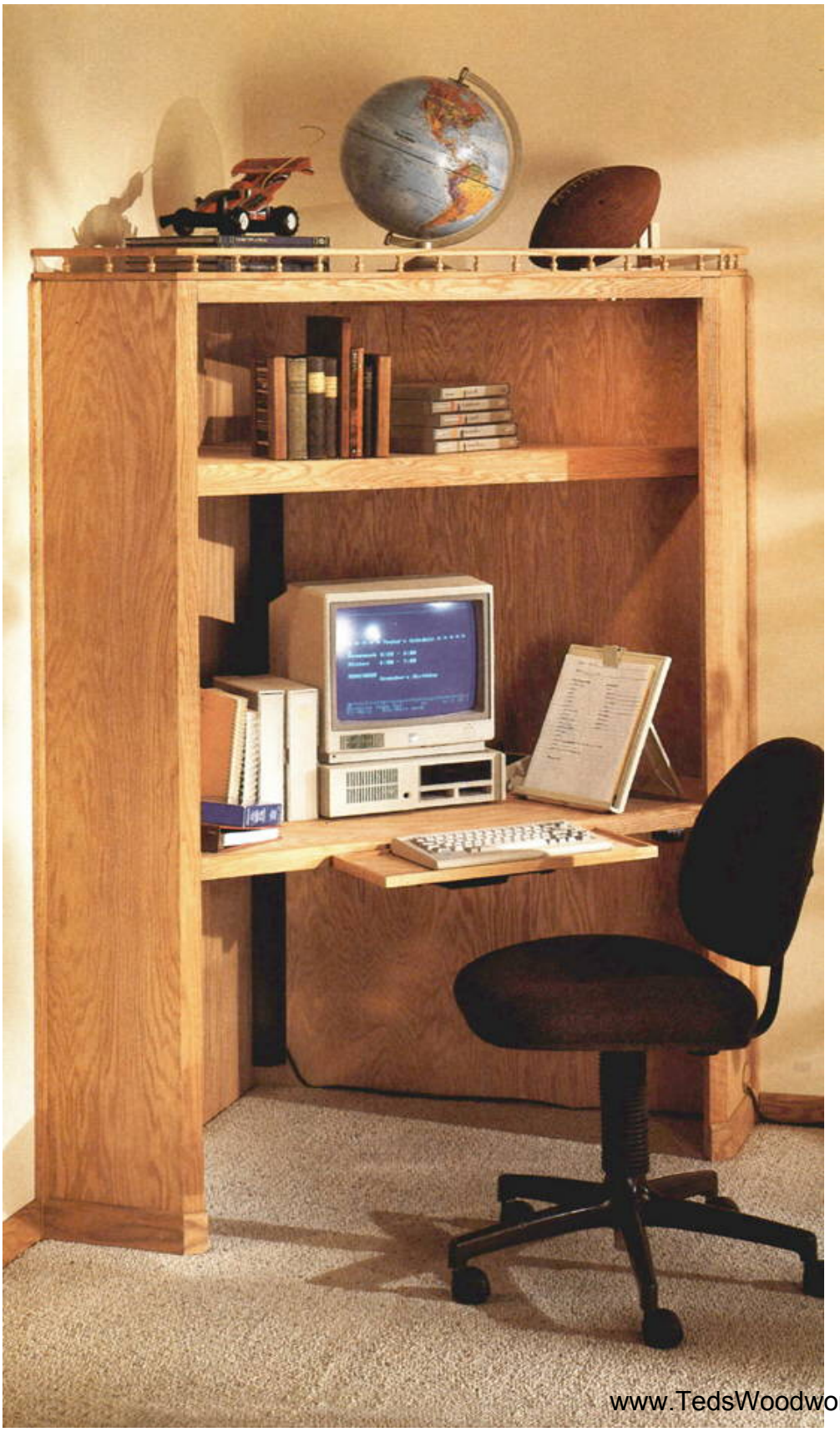
19. **Make the door.** This door is optional and hides the "record" shelves. The vertical stiles and horizontal rails are made on the shaper with the Complete Cabinet Set. The cutter is used in different combinations and positions on the insides of the rails and stiles, and on the ends of the rails. The Bead and Quarter Round Cutter is used on the outsides of the pieces to round the outer edges on the front only.

This cutter kit takes some practice to perfect, so plan to spend time experimenting on scrap wood before making the door. It is a challenge to work out, but the appearance of a nice looking, door makes it worth while.

Slide a 1/4" oak plywood panel into the frame pieces. Glue and clamp the pieces together - no dowels are necessary because of the way the rails and stiles fit together.

Apply your finish, add hinges, and attach the door to the bookcase.

CORNER CABINET



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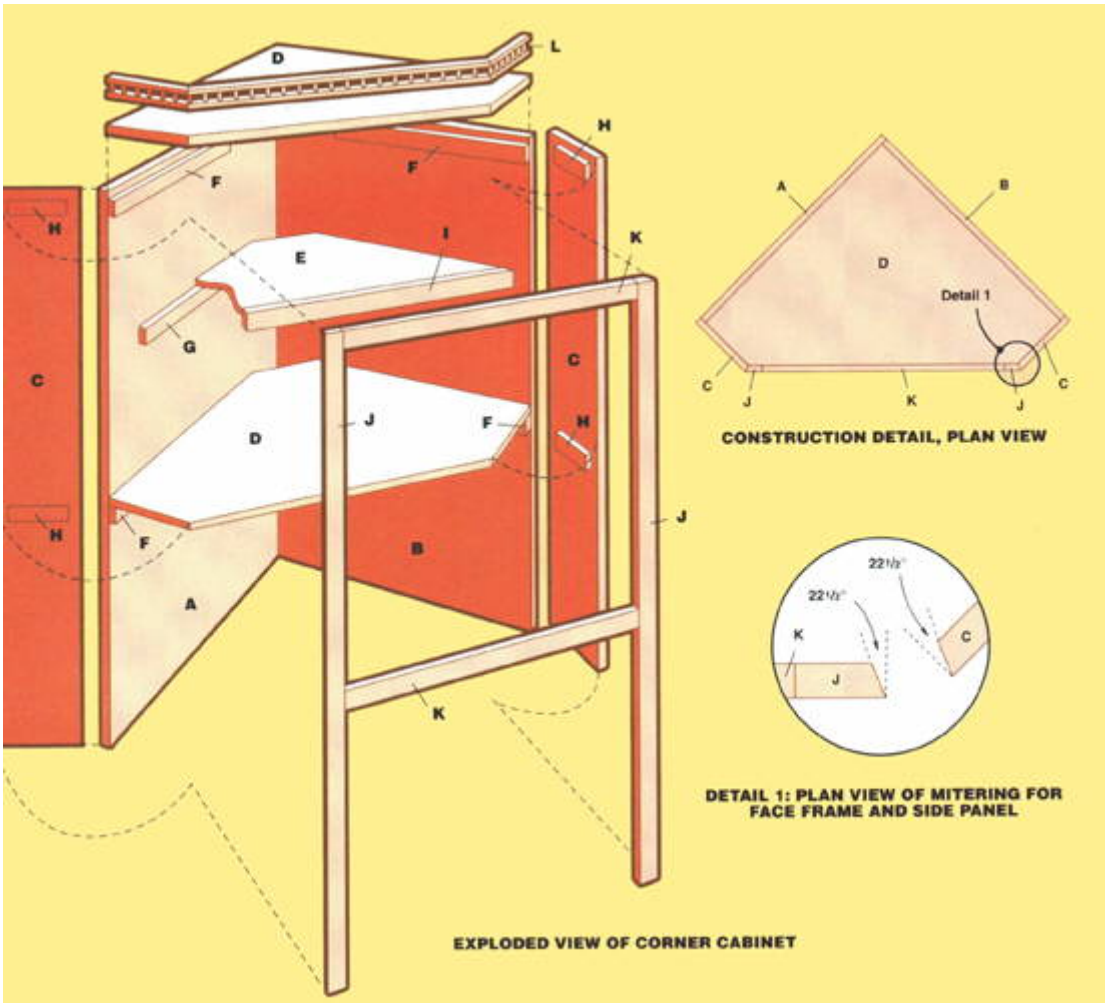
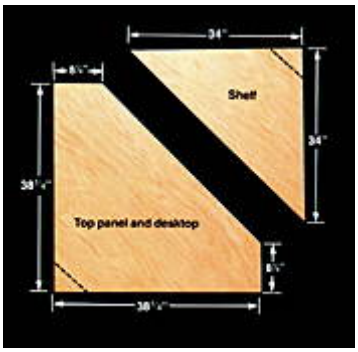
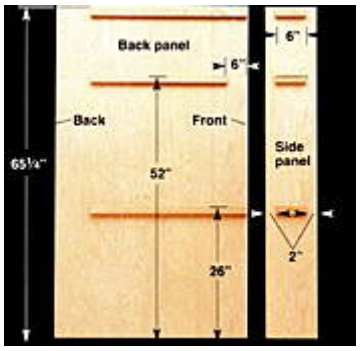


Key	Part	Material	Pieces	Size
A	Left back panel	3/4" oak plywood	1	39" Ã?? 66"
B	Right back panel	3/4" oak plywood	1	38 1/4" Ã?? 66"
C	Side panels	3/4" oak plywood	2	10" Ã?? 66"
D	Desktop and top panel	3/4" oak plywood	2	38 1/4" Ã?? 38 1/4"
E	Shelf	3/4" oak plywood	1	34" Ã?? 34"
F	Cleats for desktop, top panel	1 Ã?? 2	4	31"
G	Cleats for shelf	1 Ã?? 2	2	27"
H	Cleats on side panels	1 Ã?? 2	4	6"
I	Shelf edging	1 Ã?? 2	1	51 1/2"
J	Face frame stiles	1 Ã?? 2	2	66"
K	Face frame rails	1 Ã?? 2	2	37 1/2"
L	Decorative top trim	spindle rail		5 linear ft.



Desktop, top panel, and shelf are made from 3/4" finish-grade plywood. Use a circular saw and a straightedge guide to cut the pieces to the dimensions shown. If you plan to use the cabinet as a computer work center or an entertainment center, cut off the back corners of the desktop and shelf (but not the top panel) to provide ventilation and space for routing electrical cords.



Back panel and side panels have 1 × 2 hardwood cleats to hold the desktop, shelf, and top panel. Attach them to the panels with glue and 1 1/2" screws driven into counterbored pilot holes. Position cleats according to dimensions shown. **NOTE:** If you wish to make the shelf the same size as the desktop, add shelf cleats to the side panels (dotted line).

1. Measure and cut back panels (left panel overlaps right panel, so it is 3/4" wider than right panel). Cut and attach 1 × 2 cleats. Drill counterbored pilot holes in cleats, then attach cleats with glue and 1 1/4" screws.

2. Clamp right back panel (38 1/4" wide) to your workbench, then apply glue to back edge. Butt left panel (39") against glued edge, and hold in place with clamps. Join back panels by drilling pilot holes and driving 2" screws through butt joint.

3. Attach a plastic wire organizer to one back panel edge, next to the corner joint, using 1" wire nails. (Skip

4. Measure and cut the desktop, then apply glue to the tops of the desktop cleats mounted on the back panels. Set the desktop on the cleats, then attach by

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this step if you do not plan to store electronic equipment in the corner cabinet.)

5. Measure and cut shelf, then install on shelf cleats with glue and 1 1/4" finish nails. Measure and cut a 1 × 2 hardwood shelf edge with 45º mitered corners to fit flush with top of shelf. Attach with 2" finish nails driven through pilot holes.

7. Attach 6" cleats to side panels using glue and 1 1/4" finish nails, then attach side panels to back panels with glue and 1 1/2" screws driven into counterbored pilot holes. Cut top panel and attach to cleats with 1 1/4" finish nails.

drilling pilot holes and driving 1 1/4" finish nails every 8".

6. Set a table saw blade to 22 1/2º blade angle, then cut 10"-wide, 66"-long side panels, beveling the front edge of each panel.

8. With table saw blade set to 22 1/2º, cut 1 × 2 face frame stiles (as in step 6). Apply glue to the outside edge of each side panel, then attach stiles to side panels using 2" finish nails driven through pilot holes at 8" intervals.

9. Measure and cut 1 × 2 face frame rails. Attach them to edges of desktop and top panel, so upper edges of rails are flush with the surfaces of the shelf and top, using glue and 2" finish nails driven through pilot holes.

10. Measure and cut decorative trim to match the angle of the face frame stiles and side panels, then attach the trim to the outside edges at the top of the cabinet, using finish nails.

11. With a helper, move cabinet into corner, flush against the walls.

12. Shim below the side panels, if necessary, to bring the cabinet to level.

13. Drill pilot holes, then toenail the cabinet to the floor at shim locations, using 2" finish nails. Score the shims with a utility knife, then break off the excess shim

14. Attach the cabinet to the wall with 3" screws driven through the back panels and into wall studs. Drive screws just behind or below shelf cleats to keep them out of sight.

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material.

15. Measure and cut base shoe molding to cover the gap between the cabinet and the walls and floor, using 1 1/2" finish nails. **TIP:** To protect wall from oil or paint, insert plastic between molding and wall as you attach the molding.

16. Sand and finish cabinet then remove plastic. If cabinet will contain electronic equipment, use a hole saw or forstner bit to cut a hole for an outlet strip cord in side panel, then feed cord through hole and install a grommet.

17. Install any other hardware and computer desk accessories, like a retractable keyboard slide, that you need to complete your project.

PLAY HOUSE

Materials List

Quantity	Item
11	2" x 6" x 8' lumber rated for outdoor use
1	10' x 10' sheet of 1 mil. plastic film
2	4' x 8' sheets of 3/4" CDX plywood
18	2" x 4" x 12' spruce
14	2" x 4" x 8' spruce
3	4" x 4" x 8' lumber rated for outdoor use
7	4' x 8' sheets of 5/8" T-111 sheathing
3	5/4" x 6" x 12' lumber rated for outdoor use
4	4' x 8' sheets of 1/2" sheathing
1	36"-long roll of 15-lb. roofing felt
3	bundles of roofing shingles
	small quantity of roofing cement
3	windows
3	tubes of caulking compound
5	1" x 4" x 8' Ponderosa Pine
1	1" x 4" x 6' Ponderosa Pine
2	1" x 3" x 12' Ponderosa Pine
1	1" x 6" x 8' Ponderosa Pine
3	1" x 2" x 12' Ponderosa Pine
2	gallons latex primer
1	gallon latex top coat paint
2	quarts of accent colors, depending on color scheme
2	8' pieces of drip edge
4	decorative fan brackets (optional)

Step 1: Site Preparation
Select a site that is fairly level and has good drainage. Using a tape measure and a framing square, measure an 8' x 8' square. Check that your site is perfectly square by measuring the diagonals. If they each measure 11' 6", your site is a perfect 8' square.

Step 2: Outer Frame
Use two 8' lengths of 2" x 6" lumber rated for outdoor use for the front and rear rim joists. From two more 8' lengths of 2" x 6"lumber rated for outdoor use, cut two pieces of 2" x 6" x 7' 6" for the side rim joists. Assemble the outer frame by nailing through the front and rear rim joists into the side rim joists, using two 12d 3 1/4" common nails for each corner. See Figure 1.

Step 3: Leveling the Site
Level the ground under your floor frame using a shovel and a rake. Check your level by placing a 4'-long carpenter's level on top of the rim joists (you may have to prop up a corner of the floor with a brick or a patio block). After the site is level, move the frame away and spread a sheet of polyethylene film over the site to prevent vegetation from growing. Move the frame back into place.

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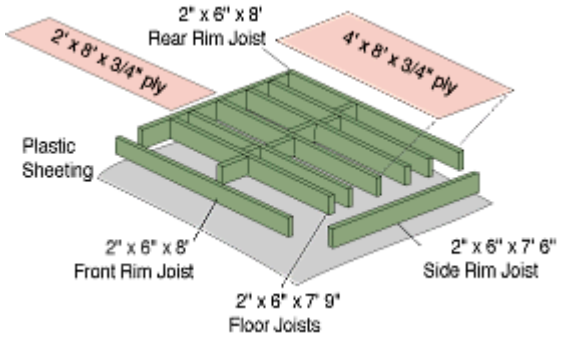
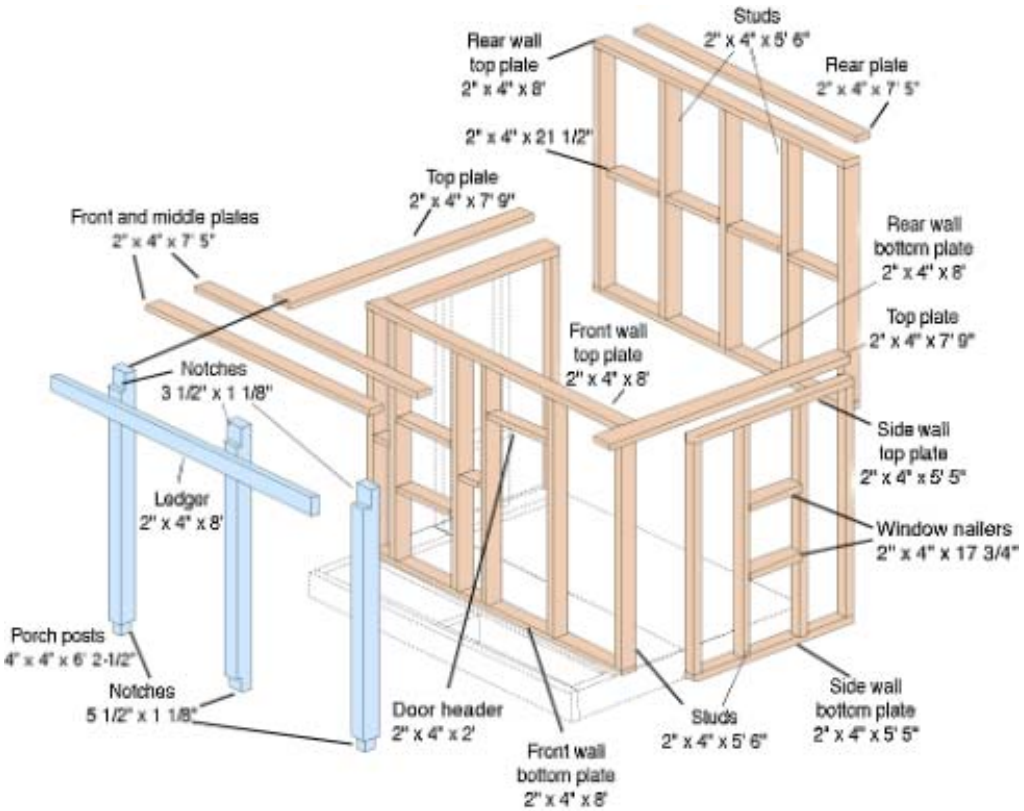
Step 4: Inner Frame Joists

From 8' lengths, cut five pieces of 2" x 6" x 7' 9" lumber rated for outdoor use for the floor joists. Measure from the outer rear corners of the frame, and locate the centers of the inner floor joists at 16", 32", 48", 64" and 72". Use two 12d 3 1/4" galvanized common nails to secure each end of the inner floor joists to the side rim joists. Measure the gaps between the inner floor joists and cut lengths of 2" x 6" lumber rated for outdoor use to fit between each pair of joists. Nail the blocks into place near the middle of the floor joists. Every second block should be offset slightly to facilitate nailing.



Step 5: Plywood Floor

Set one 4' x 8' sheet of 3/4" CDX plywood on the frame, with one edge of the sheet flush with the rear rim joist. Use the plywood as a guide to square up your frame. The front edge of the plywood sheet should fall exactly at the center of the floor joist that was secured at 48" on center. Fasten the plywood to the joists with 1 5/8" #6 coated deck screws at 8" intervals around the perimeter and at 12" intervals in the center of the plywood. Mark and cut the second sheet of 3/4" CDX plywood in half lengthwise. Put one half aside for later use as the door. Set the other half on the floor joists next to the full plywood sheet, leaving a 1/16" gap between the two sheets. Secure the half-sheet to the floor joists with 1 5/8" #6 coated deck screws.



Framing

Build the walls on the ground, stand them up and then nail them into place.

Step 1: Wall Studs
Cut nineteen 5' 6" lengths of 2" x 4" from 12' lengths for the wall studs.

Step 2: Rear Wall
Use two 8' lengths of 2" x 4" for the top and bottom plates. Space the studs 2' on center between the top and bottom plates and secure the studs by nailing through the plates with 8d 2 1/2" galvanized common nails. Cut four 2" x 4" x 21 1/2" pieces and nail them, horizontally, between the studs about halfway up the wall.

Set the rear wall in place directly over the rear rim joist and floor. Nail the rear wall into place with 16d 3 1/2" galvanized common nails, driven through the wall's bottom plate and the floor and into the rim joist. Temporarily prop up the rear wall with an 8'-long 2" x 4". Rest one end on the ground and nail the other at an angle into the right-side stud of the back wall, at a height of about 4'.

Step 3: Side Walls
The two side walls are identical. Our windows required a 17 3/4"-wide x 15 1/4"-high opening. If you use different windows, adjust the distance between the two center studs. In doing so, make sure you have a stud centered at 4' from the back of the playhouse to use as a nailer for the edges of the sheathing boards. Since the side walls will be mounted 3 1/2" from the back of the playhouse, the middle nailers should be centered at 44 1/2" from the back of the side walls.

Cut four 2" x 4" x 65" pieces from 12' lengths for the top and bottom plates. Nail the plates to the end studs with two 8d 2 1/2" common nails at each joint. Nail one stud on center at 44 1/2" from the back of each side wall. Nail another stud at the appropriate distance for the window framing.

Set one side wall in place, butted up against the end of the rear wall and flush with the edge of the side rim joist. Nail the wall into place with 16d 3 1/2" nails. Use a level to make sure that the wall is plumb and then secure it to the end of the back wall with 8d 2 1/2" common nails. Repeat for the other side wall.

Step 4: Front Wall
Use two 2" x 4" x 8' pieces for the top and bottom plates. Fasten a stud to each end of the top plate by nailing through the plate into the stud, using two 8d 2 1/2" common nails at each joint. Fasten the bottom plate to the two end studs with 8d 2 1/2" common nails. Fasten another stud 22" from the right end of the front wall for the edge of the doorway. Fasten a fourth stud so that it is centered 48" from each side of the wall. This will serve as the second stud for the doorway and as a nailer for the left front sheathing. The other two studs serve as framing for the front window. We spaced them 17 3/4" apart so that their centers were 61" and 79 1/4" from the right side of the wall (adjust for different window sizes).

Set the front wall in place, butted up against the side walls and flush with the edge of the plywood floor. Nail the front wall to the floor with 16d 3 1/2" common nails. Make sure the front and side walls are plumb and nail their end studs together with 8d 2 1/2" common nails.

Step 5: Porch Posts
Cut three 4" x 4" x 6' 2-1/2" pieces of lumber rated for outdoor use for porch posts. Cut a 3 1/2"-long by 1 1/8"-deep notch at the top of the front face of each post. The easiest way to do this is to make a series of 1 1/8"-deep cuts in the face about 1/2" apart, break out the cuts and clean out the excess wood with a 2"-wide, sharp chisel.

Cut 5 1/2"-long, 1 1/8"-deep notches on the bottom front faces of the posts, at the bottom left side of one post and at the bottom right side of another post.
Stand the left post inside the rim joists at the front left of the playhouse. The notches will allow the base of the post to be flush with the left and front rim joists. Have a helper hold the post plumb. Secure the post to the floor frame by nailing through the rim joists with four 12d 3 1/4" common nails. Repeat for right post.

Stand the center post inside the front rim joist with its center at 50" from the right side of the frame. The notch allows the base of the post to be flush with the front of the rim joist. Secure it to the rim joist with two 12d 3 1/4" common nails.

Step 6: Top Plates
Insert one 2" x 4" x 8' into the top notches of the front posts as a ledger board. Check that the posts are plumb and secure the ledger to each post with two 2 1/2" #7 deck screws.

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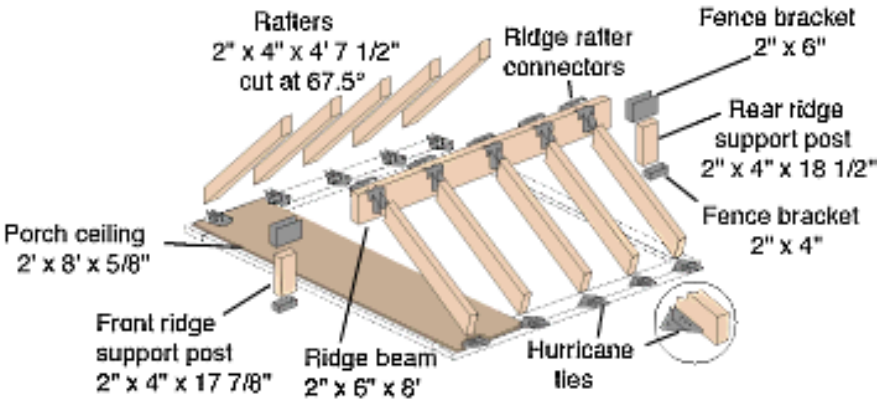
Cut two 2" x 4" x 7' 9" pieces from 8' lengths for the lateral top plates. Set one on top of each side wall, overlapping the splice between the back and side walls and stretching to the front edge of the post. Using ten 12d 3 1/4" common nails, secure each side plate by nailing into the post, the back wall splice and the top of the side wall.

Cut three 2" x 4" x 7' 5" pieces from 8' lengths for the front, middle and rear plates. Set them in place between the side plates and over the front wall, the rear wall and the ledger. Using ten 12d 3 1/4" common nails, secure the plates.

Step 7: Window and Door Framing
Cut six lengths of 2" x 4" to serve as window nailers. Our nailers are 17 3/4" wide, to bridge the distance between the two studs that serve as side framing for the windows. Using two 8d 2 1/2" galvanized common nails at each joint, fasten the lower nailer between the two studs, 24" from the floor. Check that the nailer is level before securing it.
Fit a window into the opening, resting on the lower nailer. Set the top nailer in place over the window. Remove the window and fasten the top nailer with 8d 2 1/2" galvanized common nails, driven through the studs into the nailer. Repeat for the other two windows.
Cut one 2" x 4" x 2' for the header above the front door. Insert the header between the two front door studs at a height of 5' from the floor. Make sure that it is level and then fasten the header in place, with two 8d 2 1/2"galvanized common nails, driven through the studs into each end of the header.



Roof Framing

Step 1: The Ridge Beam
Use one 2" x 6" x 8' board for the roof ridge beam. Use 1 1/2" galvanized joist hanger nails to secure five ridge rafter connectors to each side of the ridge beam. Starting from the front end of the beam, locate the centers of the connectors at 2", 24", 48", 72" and 93".

Step 2: Hurricane Ties
To ensure that the rafters are secured to the proper locations on top of the two side walls, set the ridge beam on top of each side wall in succession, allowing the beam to overhang 1 1/2" in the front and 1 1/2" in the back. Mark the top of each side wall at the center of each ridge rafter connector. Secure hurricane ties to the top of each side wall at the ridge rafter marks, using 1 1/2" galvanized joist hanger nails. Make sure the prongs of the ties are facing outward and protrude over the edges of the plates.

Step 3: Porch Ceiling
Cut one 4' x 8' sheet of 5/8" T-111 tongue and groove sheathing in half, lengthwise, for the porch ceiling. Set half the sheet, groove-side down, over the front wall and flush with the front edge of the posts. Mark the location of the front hurricane ties on the sheathing and cut 1 3/4"-wide, 1 3/4"-deep notches in the sheathing at each hurricane tie location. Set the sheathing back in place and secure it to the wall plates with 1 5/8" #6 coated deck screws every 6" around the perimeter.

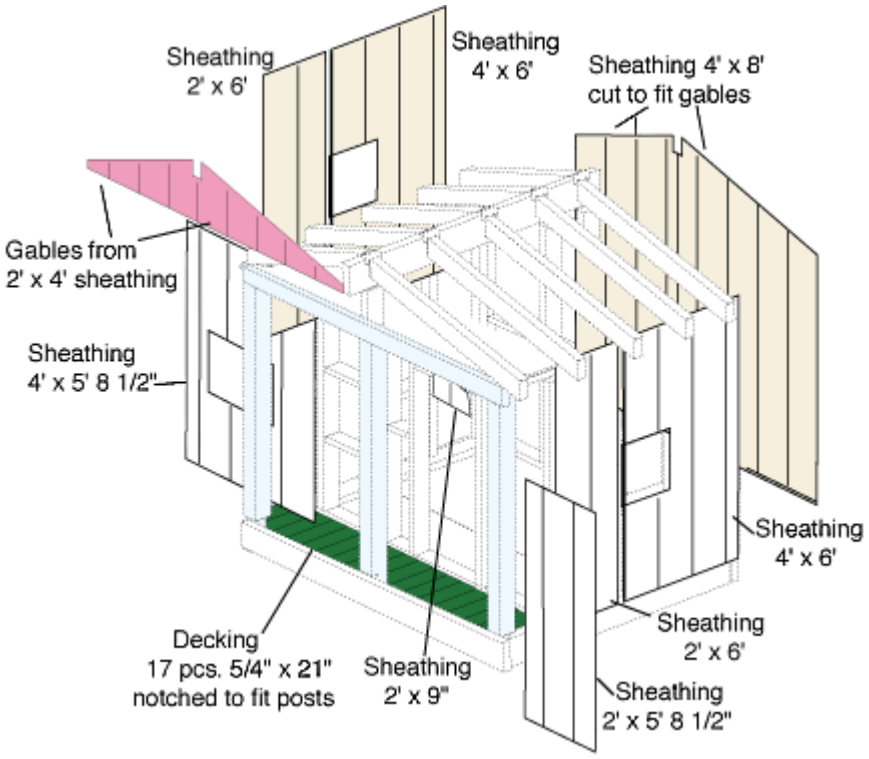
Step 4: Front Ridge Support Post
Cut one 2" x 4" x 17 7/8" piece for the front ridge support post. Using 1 1/2" joist hanger nails, secure one 2" x 6" fence bracket to the top edge of the ridge beam support post, flush with the front of the post, as shown in Figure 3. Secure the support post to the center of the porch ceiling, flush with the front edge, using a 2" x 4" fence bracket and 1 1/2" joist hanger nails.

Step 5: Rear Ridge Beam Support Post
Cut one 2" x 4" x 18 1/2" piece for the rear ridge beam support post. Prepare the top of the post as outlined in Step 4. Center a 2" x 4" fence bracket over the rear wall plate, flush with the rear edge of the plate. Secure the bracket and post as outlined in Step 4.

Step 6: Fastening the Ridge Beam
Set the ridge beam, rafter connector-side up, into the 2" x 6" fence brackets. The beam should overhang the posts by 2" in the front and 1" in the back. Using 1 1/4" #6 deck screws, secure the beam to the brackets.

Step 7: The End Rafters
A miter saw is particularly useful for cutting the rafters. They are 55 1/2"-long parallelograms, cut from 2" x 4" lumber. Cut ten rafters at 67 1/2° angles, as shown in Figure 3. Using one 1 1/4" #6 deck screw, secure one rafter to each of the front ridge rafter connectors and set the other end of each rafter into the appropriate hurricane tie. Use a torpedo level to bring the front ridge beam support post to a plumb position. Secure each front rafter to its hurricane tie with one 1 1/4" #6 deck screw. Repeat for rear rafters.

Step 8: Securing the Rafters
Insert the remaining rafters into the ridge rafter connectors and hurricane ties. Using 1 1/2" galvanized joist hanger nails, fasten all rafters to the hurricane ties and rafter connectors. It is vital to use all of the fastening holes in the connectors, as this will increase the strength and snow-bearing capacity of the roof.



Decking & Sheathing

Step 1: Decking
Cut 17 pieces of 5/4" x 6" x 21" for the front deck boards. Notch one deck board to fit around the left post and secure it to the front and left rim joists and the floor joist with 2" #7 deck screws. Use two 16d 3 1/2" common nails as spacers between deck boards and secure all deck boards in place. You will need to notch two boards to fit around the center and right posts. You will also have to trim the right decking board to make it flush with the right rim joist.

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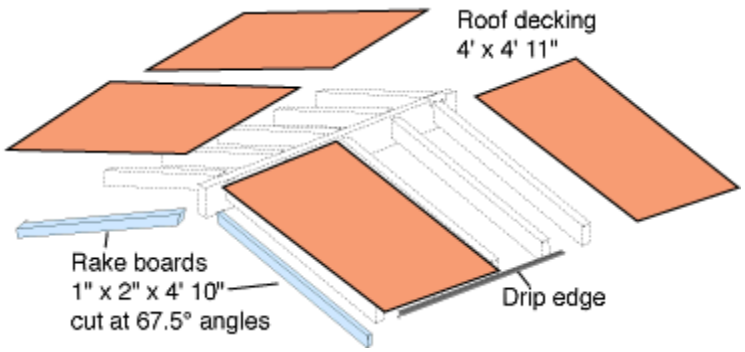
Step 2: Rear Wall Sheathing
Position two 4' x 8' sheets of T-111 tongue-and-groove sheathing vertically, so that they fit together at the center stud of the rear wall and reach the top of the ridge. Using two 6d 2" finishing nails, hammered through the sheathing and about 1" into two studs, tack each rear sheathing board into position. The boards will be bent slightly at the top because the ridge beam hangs over the rafters. Mark each sheet of sheathing for the ridge beam notch. Remove the sheathing and cut the notches. Tack the sheathing back into place and mark the sheets for the gable cuts.

Cut the sheathing for the rear gable and use the two sheets as templates for marking the front gable angles on two other sheets of sheathing, making sure that the front gable sheathing boards meet with a tongue on one side and a groove on the other. Mark the sheathing for the location of wall studs and then secure the sheathing to the rear wall with 1 3/4" galvanized ring shank nails, spaced 6" apart around the perimeter and 12" apart on the rest of the board.

Step 3: Side Wall Sheathing
Cut two 2' x 6' pieces of T-111 sheathing from one 4' x 8' sheet. Butt the straight edge of one board against the front edge of the playhouse and push the sheathing up until it is 1/16" from the bottom of the rafters. Fasten it to the front wall stud and the top and bottom wall plates with 13/4" galvanized ring shank nails at 6" intervals. Do not secure the sheathing to the stud that is 48" from the rear wall at this point.

Cut the front gables from the tops of the two previously marked sheets of sheathing. You will have two 4' x 6' sheets left that should be used as the side wall sheathing. Attach, using 1 3/4" ring shank nails.

Step 4: Front Wall Sheathing
Fasten the two gable sheathing pieces to the front gables, using 1 3/4" ring shank nails. Cut one sheet of T-111 sheathing to a height of 68 1/2" and secure it to the left side of the front wall, using 1 3/4" ring shank nails. Cut a 68 1/2"-high piece of sheathing from the 2' x 8' piece that was left from the front shelf cut. Nail it to the left front side of the playhouse with 1 3/4" ring shank nails. Cut a 2' x 9" piece of sheathing and nail it to the door header, top plate and door studs with 1 3/4" ring shank nails.



Roof Deck

Step 1: Laying Out the Deck
Cut four 4' x 4' 11" pieces of 1/2" plywood sheathing from the four 4' x 8' sheets. Snap chalk lines down the centers of the middle rafters on each side of the roof. Those lines should be exactly 4' from each end of the ridge beam. Stand on the front shelf and carefully position the left front piece of sheathing so that one side meets the center of the left middle rafter. The top end of the sheet should be positioned directly over the center of the ridge board. Tack the sheet in place, using two 6d 2" finishing nails, driven to a depth of about 1" through the deck board and into the rafters.

Step 2: Fitting the Deck Sheets
Set the second deck sheet in place next to the first sheet, leaving a 1/16" gap between the two sheets. Tack the sheet in place with two 6d 2" finishing nails. Set the right rear roof deck sheet in place and make sure that the sheets meet at the ridge. If they do not, adjust the sheets until they do. Do not tack the right rear deck sheet at this time.

Step 3: Nailing the Roof Deck
Remove the right rear roof deck sheet. This will allow you to stand on a ladder inside the playhouse to secure the left deck boards. Snap chalk lines on the two left roof deck boards to mark the positions of the rafters. Using 6d 1 7/8" coated cooler nails, fasten the roof deck boards to the rafters. The nails should be positioned at 6" intervals around the perimeter and at 12" intervals in the centers of the sheets.

Secure the right roof decking boards in the same way. To secure the front right board, you will need to sit on the peak of the roof.

Step 4: Drip Edge
Cut two 8' 2" pieces of drip edge. Secure them to the left and right edges of the roof deck with 7/8" roofing nails.

Step 5: Rake Boards
Cut two pieces of 1" x 2" x 4' 10" boards at 67 1/2° angles from a 12' length for the rake boards. They are parallelograms that match the angles of the rafters. Using five 1 5/8" #6 deck screws, driven through the roofing deck, fasten the rake boards flush with the front edges of the roofing deck.

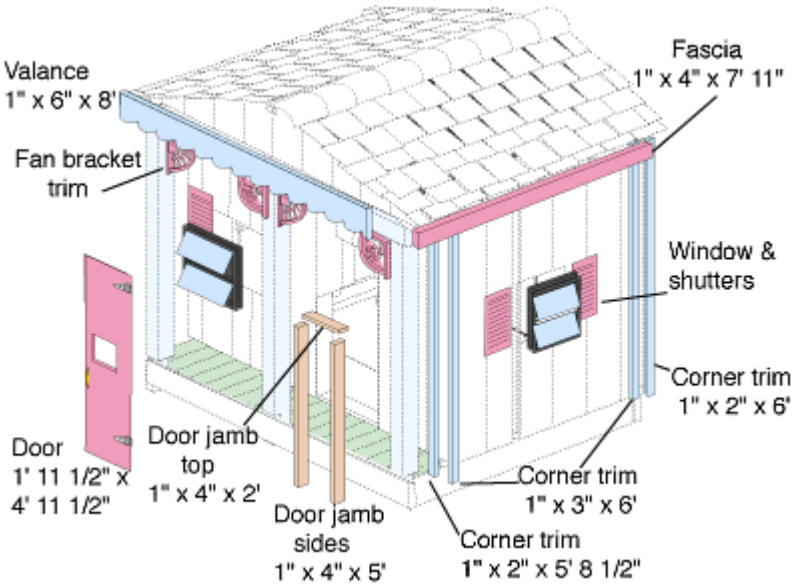
Roofing

Wear sneakers when roofing on a warm day. Since the materials are designed to bond together by melting slightly in warm weather, heavy, hard shoes can mar the shingles. Do as much work as you can from a ladder and then sit on the roof for the remainder of the work.

Step 1: Roofing Felt
Snap chalk lines across each side of the roof deck, 34" and 50" up from the drip edges. Place a 36'-long roll of roofing felt at one corner of the deck. Roll it out along the first chalk line, extending over the front and rear of the deck by 2". Cut the felt with a sharp utility knife. Staple the roofing felt down with 9/16" staples, spaced about 18" apart. Roll out and staple down the next course of felt, along the second chalk line, overlapping the first courses by about 8". Repeat for the other side of the roof. Roll out and staple down the ridge course, overlapping the second courses on both sides by about 10".

Step 2: Shingles
Since asphalt roof shingles vary from manufacturer to manufacturer, carefully read the instructions provided with your shingles. In general, three bundles of asphalt shingles is enough material to cover a 100-square-foot area, or slightly more than is needed to cover this playhouse roof.

To ensure that nails do not protrude into the playhouse, secure the shingles with 7/8"-long roofing nails. Cut shingles on the smooth side, using a sharp utility knife. If you follow the manufacturer's instructions carefully, you should have only two exposed roofing nails on the ridge. They must be covered with roofing cement.



Windows, Doors & Trim

Step 1: Window Openings
From inside the playhouse, drill 1/2" holes through the sheathing in the four corners of the rectangular window frames. Use a framing

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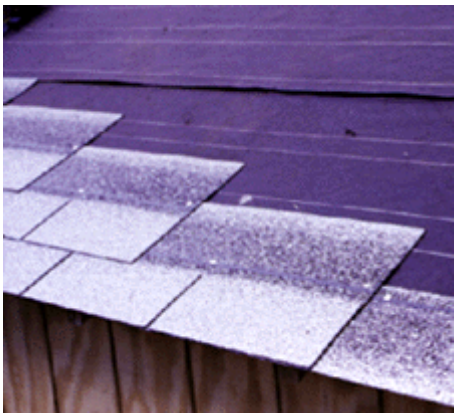
square to draw lines for each window on the outer sheathing, linking the four holes for each window. Cut out the window rectangles. We used a DeWalt cordless circular saw to make the cut. It can also be done with a saber saw.

Step 2: Inserting Windows
Caulk liberally along the inside flange of each window and then secure it in place according to the manufacturer's instructions.

Step 3: Door Opening
Using a handsaw, cut away the bottom plate of the doorway framing in the front wall. Cut one 2' piece and two 5' pieces of 1" x 4" Ponderosa Pine from a 12' length for the top and sides of the door jamb. Using 6d 2" finishing nails, join the top piece to each of the 5' jamb sides. Set the jamb in the door opening and nail it in place with 6d 2" finishing nails. Although it is preferable to make the door jamb level and plumb for the sake of appearance, it is not really necessary because the door will mount over the jamb, rather than inside it.



Step 4: Door
Cut a 1' 11 1/2" x 4' 11 1/2" door from the remaining half-sheet of 3/4" CDX plywood. Secure the door with 4" galvanized tee-hinges, mounted on the right side of the jamb on the outside of the playhouse. The hinges should be positioned 10" from the top and bottom of the door. When mounting the door, set it on a piece of scrap shingle to create a 1/8" clearance from the deck boards. If your playhouse is square, your door should fit inside the right and left pieces of T-111 sheathing.

Step 5: Fascia
Cut two 7' 11" pieces of 1" x 4" Ponderosa Pine for the fascia boards to cover the exposed edges of the rafters. Secure them to the rafters with 6d 2" finishing nails.

Step 6: Exterior Corner Trim
Cut four 6' pieces of 1" x 3" Ponderosa Pine and two 6' pieces of 1" x 2" Ponderosa Pine from 12' lengths. Caulk the back of a 1" x 2" piece and secure it lengthwise to the rear corner of the side wall, flush with the edge of the back wall and the bottom of the sheathing, using 6d 2" finishing nails. Caulk the back of a 1" x 3" and secure it to the corner of the back wall, flush with the outer edge of the 1" x 2" trim. Repeat for the other rear corner.

Cut two 5' 8 1/2" pieces of 1" x 2" Ponderosa Pine for the front wall corner trim. Caulk the back of a 1" x 2" and secure it lengthwise to the right corner of the front wall, flush with the edge of the side wall, using 6d 2" finishing nails. Caulk the back of a 1" x 3" and secure it to the corner of the front wall, flush with the outer edge of the 1" x 2" and the base of the sheathing. Repeat for the remaining corner.

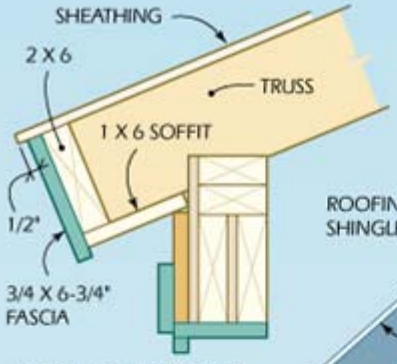
Step 7: Paint the Playhouse
Use a top-quality outdoor latex primer and top coat. We chose Enterprise® Severe Weather because it has a warrantee of 15 years. For a playhouse that blends with the exterior of your house, choose colors that are compatible with your home's color scheme. Or have fun and let your children select a color palette.

Step 8: Finishing Touches
Since 18"-long shutters are difficult to find, we used shutters from two interior-wood shutter kits and secured them to the sheathing at the sides of the windows, with 11/4" #6 deck screws. We fastened decorative fan brackets at the front corners of the playhouse, using 6d 2" finishing nails. Using a saber saw, we made the scalloped valance from an 8' piece of 1" x 6" Ponderosa Pine, finished it off with a router and then nailed it in place with 6d 2" finishing nails. We also cut a hole in the door for a Plexiglas window and trimmed the rough opening with corner molding.

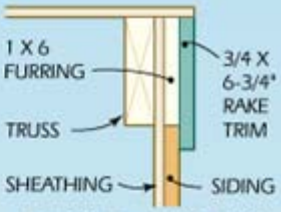
SHED

GARDEN SHED

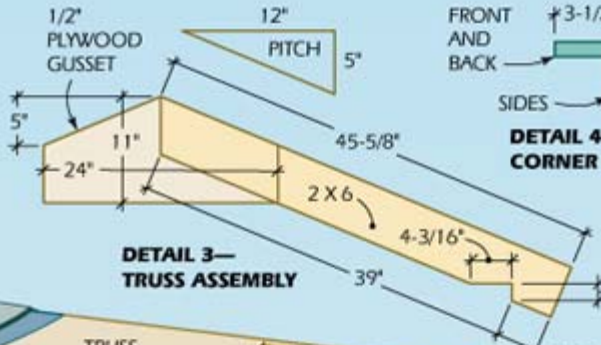
7'5" DEEP X 8'3" WIDE X 9'4" HIGH



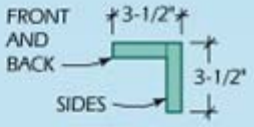
DETAIL 1—EAVE TRIM



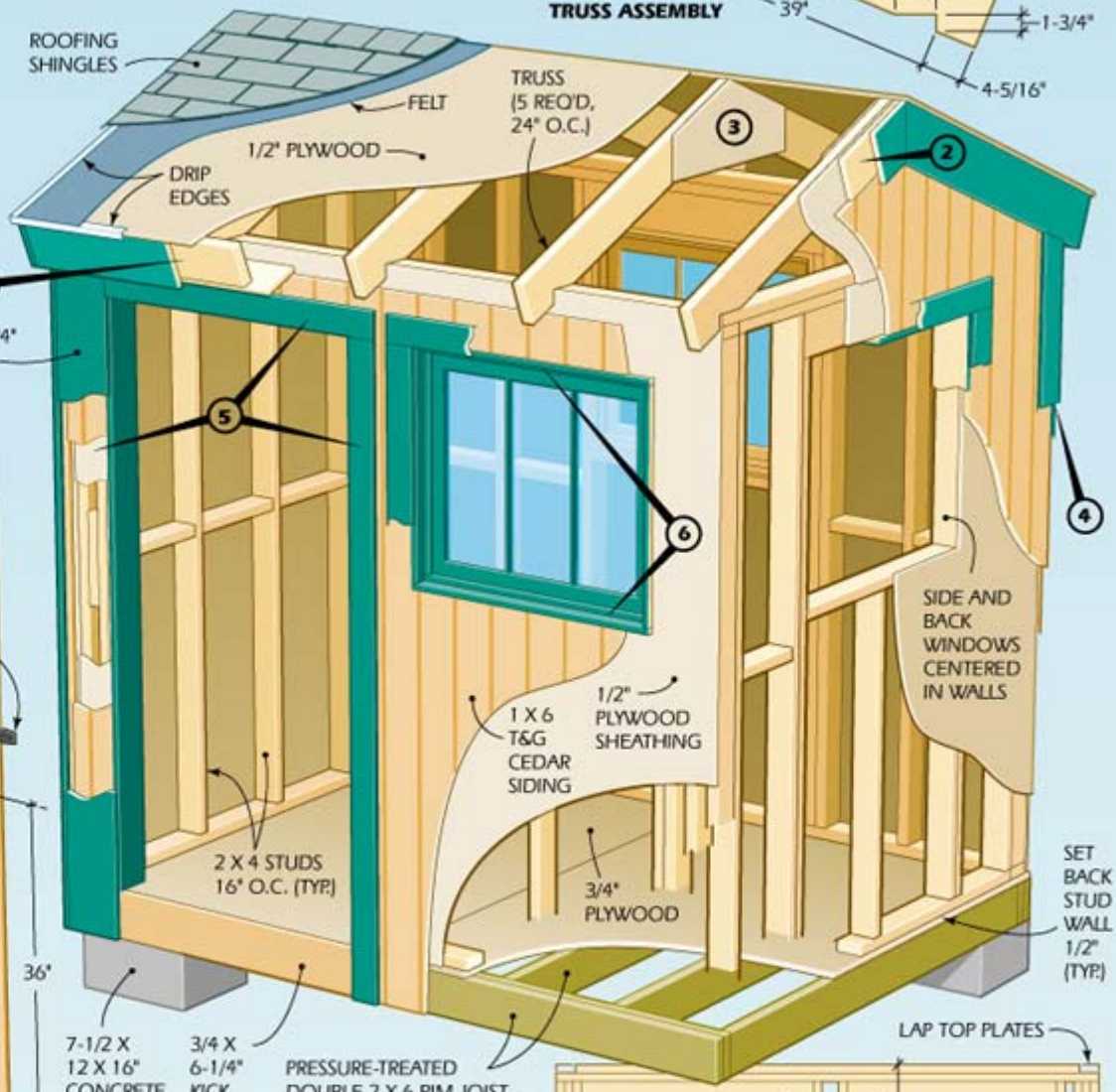
DETAIL 2— RAKE TRIM

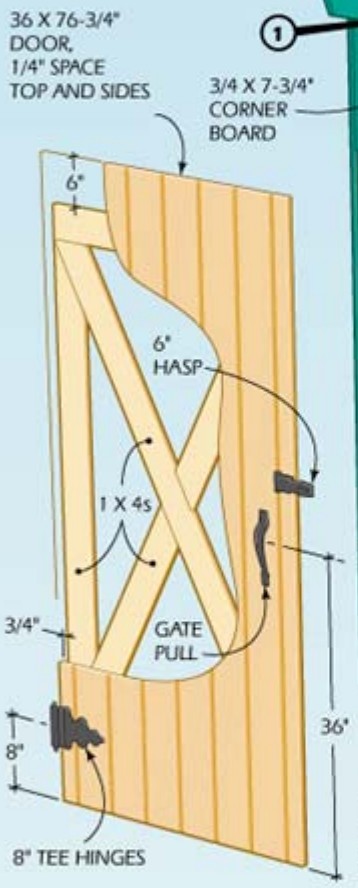


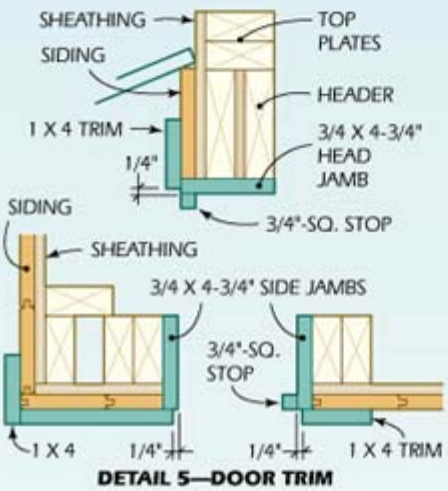
DETAIL 3— TRUSS ASSEMBLY



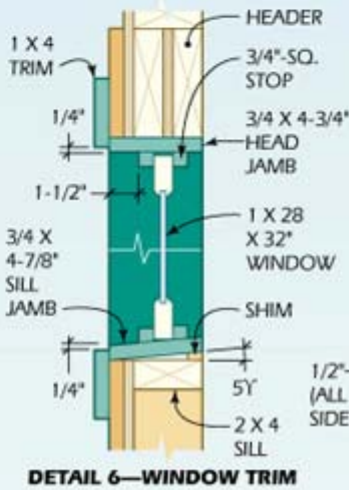
DETAIL 4— CORNER BOARDS



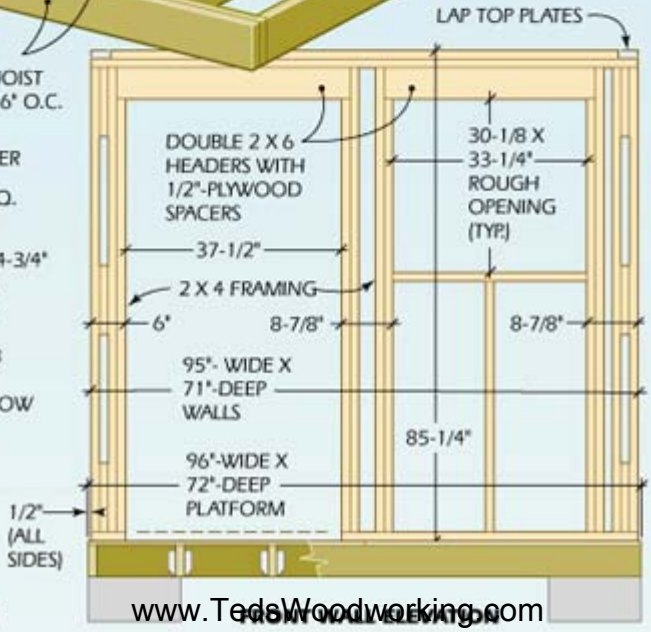




DETAIL 5—DOOR TRIM



DETAIL 6—WINDOW TRIM



FRONT WALL ELEVATION

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Site Work

Begin by marking out the building's location in your yard. For a structure of this size, it's simplest to build a lightweight frame that's the exact size of the shed, then use the frame to mark the site.

Use 3/4-in.-thick pine to build your frame. Cut the sides to the exact dimensions of the floor, and use one screw in each corner to fasten the sides into a rectangle. Screw a diagonal brace between two sides of the frame to hold it square.

Clear the building site and level any obvious high spots. Place the frame in the site and adjust its position until you're happy with the location of the shed. Drive stakes into the ground to mark each corner, stretch string between them (Photo 1) and then remove the frame.

Find the highest corner of the site and excavate for the first foundation corner block. Plan on having 3 to 4 in. of block exposed above grade. Dig out an area several inches wider than the block. Spread 2 or 3 in. of crushed stone in the hole to form a stable base for the block.

Now you're ready to position the first block, aligning its edges with the layout string. Check that the block is level across its length and width (Photo 2), and adjust the crushed stone as required.

Use a long, straight 2 x 4 and level to check the relative height of the second corner, then excavate the site for the block. Check that the second block is level with the first (Photo 3), and add the remaining corner blocks in the same way.

Use a wooden frame to find the best spot for your shed. Drive a stake at each corner and use string to delineate the site.

Dig a hole for the first block at the highest point in the grade. Add gravel, install the block, align it with the string, and level it

.

Use a straight 2 x 4 and a 4-ft. level to check that the corner blocks are installed at the same height.

After marking joist locations on long front and rear rim joists, install metal hangers with 1-1/2-in. joist hanger nails.

Lay the front and rear joists on the corner blocks. Then, cut the joists, position them in the joist hangers and secure with nails.

After doubling the front and rear joists, add the 3/4-in. plywood floor. Nail it in place with 8d nails spaced about 6 in. apart.

Building The Floor

It's a good idea to use pressure-treated lumber for the floor joists. Cut 2 x 6 stock to length for the front and back rim joists, and then lay out the locations of the floor joists on 16-in. centers. Nail joist hangers to the inside surface of each inner joist using 1-1/2-in. joist hanger nails (Photo 4). Next, place the inner front and back joists between the corner blocks, and then cut and position the floor joists (Photo 5). Nail the floor joists in place, then attach the outer rim joists to the front and back of the floor frame.

Compare opposite diagonal measurements of the floor assembly to check that it's square. Nail 3/4-in.-thick plywood to the joists for the shed floor (Photo 6).

Wall Construction

Cut 2 x 6 stock to size for the door and window headers. Use pieces of 1/2-in. plywood as spacers between the 2 x 6s to bring the header assemblies to 3-1/2 in. thick. Nail together the header pieces with 16d common nails.

Cut 2 x 4 stock to length for the wall studs and window and door jack studs. Nail each jack stud to a wall stud with 8d common nails. Build the four corner posts by nailing three 2 x 4 spacers between two studs as Show on the diagram

Begin framing the back wall by laying out the stud locations on the top and bottom plates. Then, lay out the framing members on the deck (Photo 7). Nail through the top plate and into the wall members, then secure the bottom plate. Frame the window opening, and nail the second top plate to the wall, keeping its ends back 3-1/2 in. from each end of the wall.

Now compare the opposite diagonal measurements of the wall and adjust the assembly until it's square. Then, apply 1/2-in. plywood sheathing, using 6d common nails spaced about 6 in. apart.

Stand the rear wall, bracing it with 2 x 4s nailed between the wall and the outside floor joists (Photo 8). Nail the bottom plate to the deck so the plywood sheathing is flush with the edge of the deck.

Frame the front wall, but don't apply the sheathing yet. Instead, stand the framed wall and brace it. Position the wall 1/2 in. from the deck edges to allow for the thickness of the sheathing. Then frame the side walls, one at a time, and stand them. Leave the second top plate off the side walls until they are raised. Nail the walls together at the corners, and then cut and install the side wall top

With the back wall framing members cut to length and headers assembled, lay out the pieces on the shed floor and join with nails.

Install 1/2-in. plywood wall sheathing on the framed back wall. Then, raise the assembly and secure it with diagonal braces.

Frame and raise the remaining walls without sheathing. After nailing together the corner studs, add the top plates.

plates (Photo 9). Use a level to check that the corners of the building are plumb, and nail temporary diagonal braces to the inside surface of each wall.

Apply the remaining plywood sheathing (Photo 10). At the side walls, keep the plywood 1-1/2 in. down from the top to provide room to nail the gable-end sheathing.

When the framing is in place and the assembly is square and plumb, add the remaining plywood sheathing.

To find the rafter cutting angle, align the 5- and 12-in. marks on the framing square's legs with the edge of the rafter stock.

Set up a worktable with the outline of the rafter assembly marked. Then, join each pair of rafters with a plywood gusset.

Framing The Roof

Use a framing square to lay out the 5-in. pitch on the first roof rafter (Photo 11). Cut out the rafter and use it as a pattern to make the second rafter. Test the first two for proper fit, then trace and cut the remaining rafters.

Cut a gusset for each truss from 1/2-in.-thick plywood as shown in the plans. Use a sheet of 3/4-in. plywood as an assembly table, and draw the outline of the roof truss directly on the plywood surface. Align two rafters over the pattern and nail the gusset to the rafters with 1-1/2-in. roofing nails (Photo 12).

Toenail the trusses to the front and rear walls with 8d common nails (Photo 13). At the gable ends keep the gussets on the inside faces of the trusses.

Cut 2 x 6 stock to length for the subfascia, and nail the boards to the rafter ends with 16d common nails. Cut and install the gable-end sheathing, and then nail 1 x 6 pine furring over the gable rafters.

Rip cedar stock to width for the front and back soffits and cut it to length. Use 6d galvanized finishing nails to fasten the soffit boards to the rafters and subfascia. Then, install the cedar fascia and rake trim.

Install the plywood roof deck, allowing it to overhang the fascia by 1/2 in. along the eaves. Nail aluminum drip edge to the eaves, and apply

With all the rafters assembled in pairs, position each pair on the wall top plates and secure by toenailing.

roofing felt. Then, install the drip edge along the ragke edes.

Roofing And Siding

Follow the manufacturer's directions for installing the roof shingles (Photo 14).

Since the tongue-and-groove siding is installed vertically, add 2 x 4 nailing blocks between the studs, about halfway up the wall. Cut and install these nailers by toenailing them between adjacent studs.

If you plan to stain or paint the trim a different color than the shed siding, it's a good idea to finish the roof trim before applying the siding. Cut siding boards to length and begin installing them at a corner of the building. Use galvanized finishing nails to fasten the boards—8d nails for fastening to the 2 x 4 framing and 6d nails for the plywood sheathing (Photo 15). Face nail the first board, but fasten succeeding boards with nails driven diagonally through the tongue so the heads will be hidden. Set the nailheads slightly below the wood surface.

Use 1/2-in. plywood for the roof deck and cover it with roofing felt. Install shingles following the manufacturer's instructions.

Nail 1 x 6 tongue-and-groove cedar siding in place. Use 8d nails over wall framing and 6d nails when nailing into plywood alone.

Cut stock for doorjambs and nail in place. At a window, install the angled sill piece first, then the top jamb, then side jambs.

Position the door in its opening with a 1/4-in. space at the top and sides. Bore pilot holes for the hinge screws and secure the hinges.

Windows And Doors

After staining or painting the siding, install the door and window jambs (Photo 16). Nail the jambs directly to the framing, with the outside edge of each jamb flush to the face of the siding. At the windows, slope the sill pieces about 5° toward the outside of the building, add the top jambs, and then cut the side jambs to fit.

Cut stops for the windows from 1 x cedar stock, and install the outer stops with 6d galvanized finishing nails. Then, place a window in each opening and add the inner stops.

Rip door and window trim and shed corner boards from rough-sawn cedar. Cut each piece to length and nail in place.

Cut siding boards to length for the shed door. Use clamps to pull the boards together, but don’t use glue on the joints. Cut the battens for the door, and screw them to the inside surface of the boards.

Hold the door hinges in place and mark the mounting-hole locations. Bore pilot holes and fasten the hinges to the shed. Position the door with a 1/4-in. space on the sides and top, and mark the hinge holes. Bore pilot holes and mount the hinges (Photo 17). Install the door pull and hasp. Cut the doorstops and nail them in place on the top and open-side jamb. Then, stain or paint the windows, door and remaining trim.

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We built a ramp from pressure-treated stock to make it easier to wheel a mower or snowthrower into the shed. To build a ramp, use 2 x 6 material spaced about 1/2 in. apart for the ramp deck, and 2 x 4 stock for battens underneath.

CORNER CABINET

Skills needed include using a circular saw. Definitely not one for beginners! Remember to allow for the room's skirting board – the top section of the cabinet will be set further into the corner than the bottom. Our cutting diagram (Figure I) allows for this

THE BOTTOM CABINET
1. Mark out the plan or template as shown in Figure I (diagram 1). It's essential to be accurate with the complex angles that occur. As you proceed, check all the components against this plan. Glue and screw all the joints.

2. Screw the two backs together at the rear corner. Position the cabinet floor in place, 90mm up from the bottom, using its 90-degrees corner to set the backs at the same angle relative to one another.

3. The top rail is made of three pieces screwed together to negotiate the front corners (see Figure I, diagram 1). Making this is the most complex section of the project. Notches are cut out of the front corners to accommodate the vertical hinging rails. The top rail is screwed into place, checking that the structure remains square. The second purpose of the top rail is to make the cabinet structurally sound, without its two side panels. This makes the installation procedure simpler and allows you to shape the side panels into the wall, allowing the cupboard to be a perfect fit regardless of irregularities in the wall surface.

4. Cut out the hinging rails, noting that they stop at the cupboard bottom. Use 42mm x 19mm radiata pine with a 67-degree chamfer, where they abut the sides. Check the top and bottom hinges; screw them in place. Add a 67-degree chamfer to the corner edge of the sides before screwing them in place temporarily.

5. Screw down through the floor into the bottom rail which is a single timber component mitred to the sidewall angle at each end.

6. Position the top using angle brackets, screwed in place from the inside and hinge the doors in place.

THE TOP SHELVES
7. Screw the two backs together and brace them against one another, using one of the triangular shelves as the top.

8. Include another fixed shelf halfway down the backs. These two will be sufficient bracing and all other shelves will be adjustable.

9. Screw the side fascias in place.

Materials for bottom cabinet:

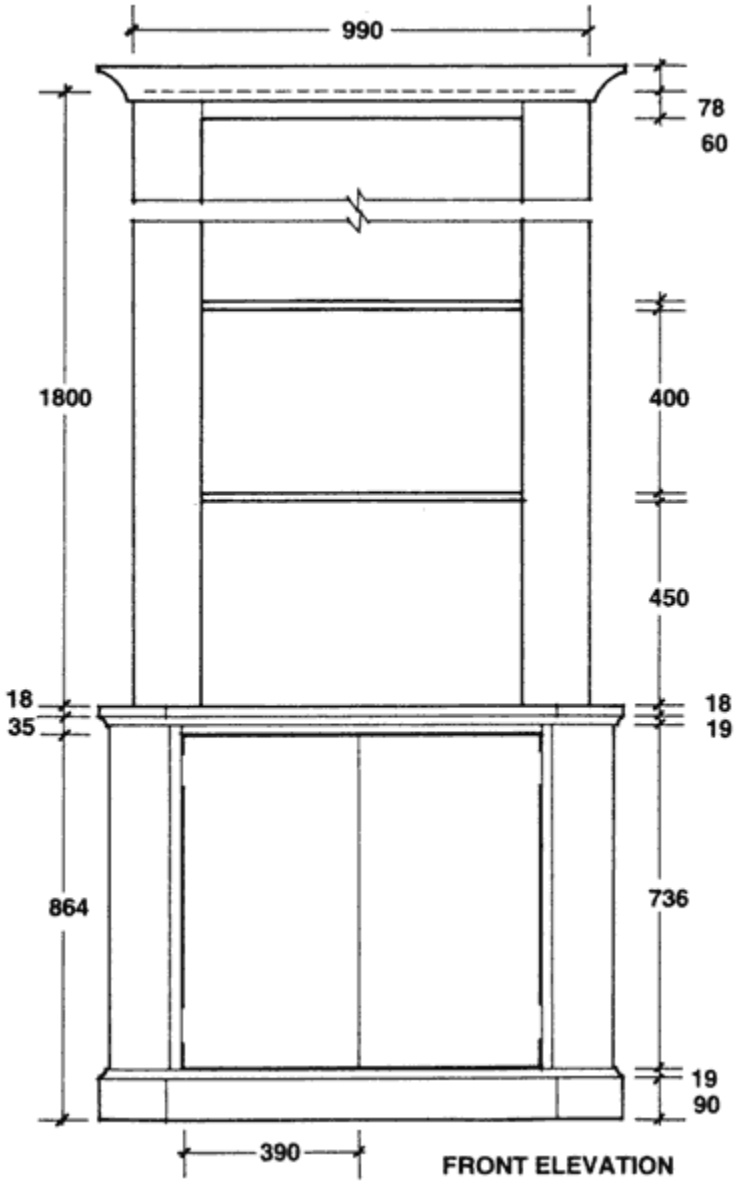
Component	Material	Length/size
Back (1 of each size)	18mm thick MDF	882mm x 800mm 882mm x 782mm
Bottom: shelf (2) sides (2)	18mm thick MDF	960mm right-angle triangle 882mm x 200mm
Rails: top/bottom (2) side (2)	45 x 35mm pine	850mm 250mm

Hinging cleats (2)	42 x 19mm pine	754mm
Skirting: sides (2) front (1)	90 x 19mm pine	225mm 850mm
Top (1)	18mm thick MDF	1060mm right-angle triangle
Doors (2)	9mm thick MDF 13mm thick lining boards	755mm x 390mm

Materials for top shelving

Component	Material	Length/size
Backs (1 of each size)	16mm thick MDF	1740mm x 665mm 1740mm x 649mm
Shelves/top (3)	18mm thick MDF	645mm right-angle triangle
Fascia (2)	18mm thick MDF	1740mm x 150mm
Cornice (1)	78mm pine cornice moulding	1100mm

Other materials: 50mm particle-board screws; wood glue; 35mm brass butt hinges (4); magnetic door catches (2); 19mm scotia for trimming.



FRONT ELEVATION

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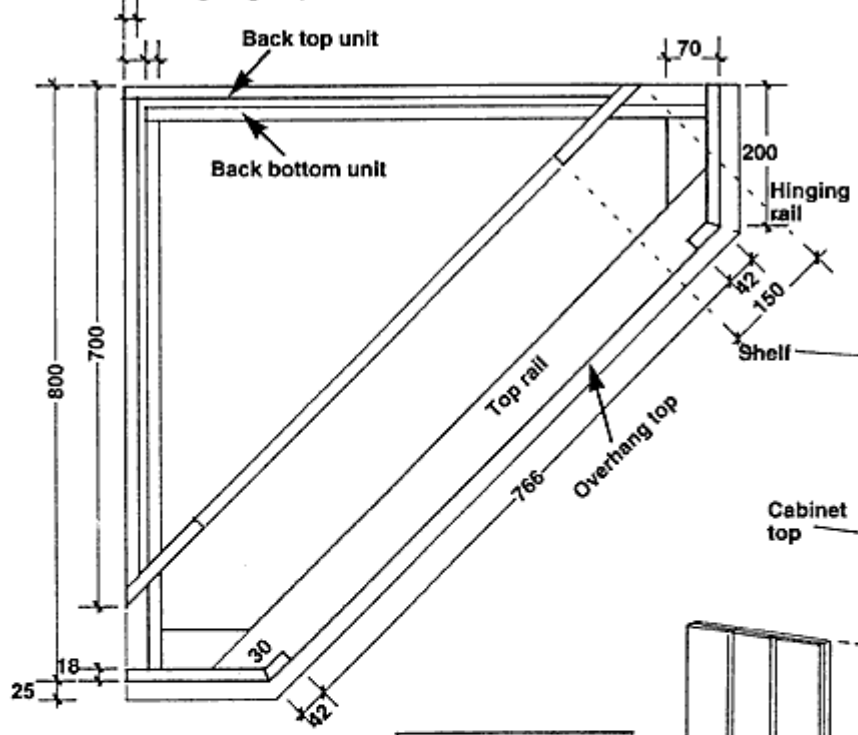
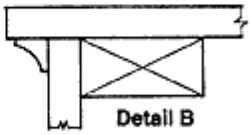
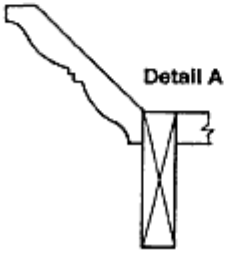
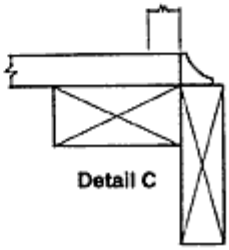
DIAGRAM 1 (cutting diagram)









All measurements in mm

DIAGRAM 2

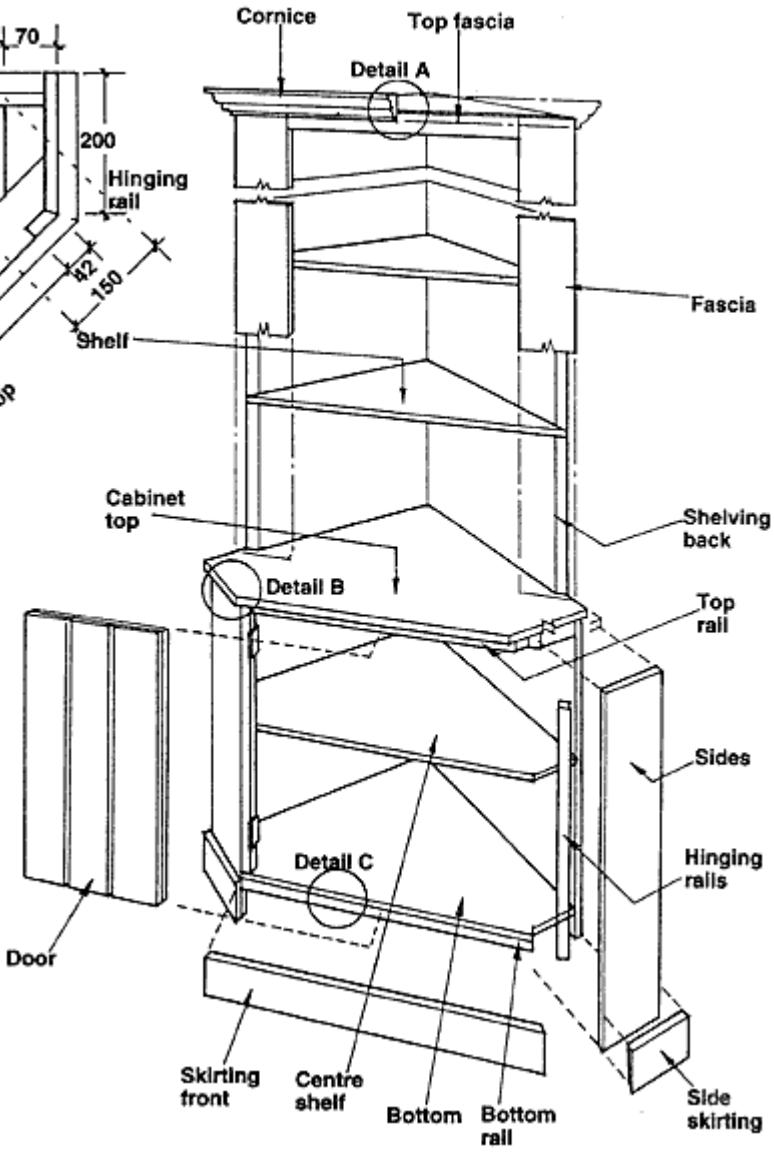


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TABLE AND BENCH SET

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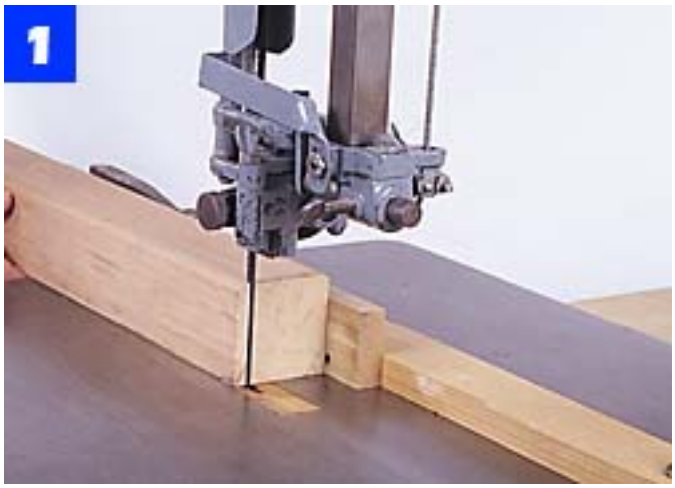
We chose red cedar for this project. This wood resists rot and insect infestation and it's readily available at lumberyards and home centers. If you can't purchase kiln-dried cedar for your project, you should buy the material several weeks before starting and stack it someplace where it will have a chance to air dry. Place evenly spaced strips of wood between each layer of boards to allow air to flow through the stack of lumber. Other suitable wood species for this project are redwood, teak and cypress. These woods are more expensive than cedar, however, and you may have a hard time finding them at lumberyards and home centers.

We should mention that we used Titebond II wood glue to assemble the furniture joints. This single-part glue is waterproof for all but the most extreme situations, such as when joints are subject to continuous submersion in water. Unlike epoxy or resorcinol adhesives that are truly waterproof, this glue is easy to use and readily available.

Making The Parts

The table legs are cut from 4 x 4 stock (or they can be glued up from thinner material). When using 4 x 4 stock, cut each leg to rough length. Next, clamp a fence to the band saw table, and rip the blanks to a 2 3/4 x 2 3/4-in. square **(Photo 1).** Then clamp the leg to a workbench, and use a razor-sharp plane to remove the saw marks **(Photo 2).** Unless you are very experienced with a hand plane, check the workpiece frequently as you go. The edges of the leg must remain square to one another. Remember that you are only smoothing the surface, so do not remove too much material.



Rip the table leg stock out of a cedar 4 x 4. Clamp a temporary rip fence to the band saw table to do this.

Clamp a table leg to a benchtop and remove saw marks with a hand plane. To make a smooth cut, push the plane at an angle.

Use a miter gauge on the band saw to crosscut the leg blanks to finished dimension **(Photo 3).**

Since the bench legs are smaller than the table legs, it is a better use of materials to glue them up from three pieces of 3/4-in.-thick stock. You can simplify the job if you plan to make the blanks large enough to cut four legs from each glued-up stack.

Crosscut the legs on the band saw. Here, a shopmade crosscutting table and a miter gauge are used to make the cut.

Rip and crosscut material for the leg blanks slightly oversize, then use a foam roller to spread glue on the mating surfaces of each piece. Assemble the pieces into a stack, and clamp the pieces together **(Photo 4).** After about 20 minutes, scrape off the glue that has squeezed from the joints, then allow the glue to fully set.

For the bench legs, spread glue on 3/4-in.-thick stock. Lay disposable material under the pieces and clamp them together.

Now use the table saw to rip the blanks to 21/4 in. wide, and crosscut the bench legs to finished length.

Lay out the mortise locations in all the legs for the apron joints. You can speed the process by clamping four legs together with their ends perfectly aligned. Then, mark across the stack using a square **(Photo 5).** Next, use the router and edge guide to cut the leg mortises **(Photo 6).** It's best to use a spiral up-cutting bit in the router because that type of bit pulls the dust and chips out of the cut, and reduces the strain on the motor. This also keeps the bit's cutting edge cooler.

Rip and crosscut the individual bench legs to size, and then clamp them together. Mark out mortise locations the legs.

Rip and crosscut 1-in.-thick stock for the table and bench aprons as well as for the top frames and slats. Install dado blades in the table saw, and then use the miter gauge to guide the workpiece over the saw blades when cutting tenons **(Photo 7).** Note that you can use the rip fence as a stop to gauge the tenon length. Since the tenons are 1 in. long, you need to make two passes to complete each cheek.

Using a spiral up-cutting bit in a plunge router, cut the table leg mortises. Two legs clamped together provide a stable base.

Use a dado blade setup in the table saw to cut the tenons on the apron pieces. Butt each apron to the fence, and make the cut.

Cut the tenons across the width of each workpiece, then adjust the blade height and move each workpiece over the blade on edge to cut the shoulder **(Photo 8).** Clamp each workpiece upright in a vise and gently round over the tenon's edges using a wood rasp **(Photo 9).**

To cut the shoulders on a tenon, stand the apron up, and hold it firmly to the miter gauge. Butt it to the fence and make the cut.

Round off a tenon with a rasp. The tenon's radius matches the radius left by the spiral up-cutting bit used to cut the mortise.

Lay out the mortise locations for the tabletop and benchtop joints. Use a router with an edge guide and a spiral up-cutting bit to cut the mortises **(Photo 10).** It is best to clamp three workpieces of the same width together when routing to form a wide and stable base for the plunge router.

Mark the location of the umbrella posthole in the center rail of the tabletop, and then use a Forstner bit in the drill press to bore the hole.

After laying out the locations of the holes in the aprons for mounting the top, use a Forstner bit in the drill press to counterbore a recess for each screwhead. Next, use a 3/16-in.-dia. bit to drill the pilot holes for the screw shanks. Each of these holes is centered in a recess.

To cut the long row of mortises in each stile and rail, clamp three of the work-pieces together to support th router.

To complete the part-making process, install a chamfer bit in the router table, then use it to cut the 3/16-in.-deep chamfer on the table and bench legs, aprons and top parts as shown in the plans **(Photo 11).** Note that not all edges are chamfered.

Use a chamfer bit in the router table to cut the chamfer on all four edges of the legs for the benches and table.

Assembly

Begin assembly with the benches, since they are smaller and are much easier to work with. After you refine your technique on them, you can assemble the table.

It's worth noting that all the parts for the table and benches should be dry assembled before glue is applied. With the assemblies joined in this manner, make reference marks and numbers on the backs of the parts or in some other discreet location. Before proceeding to gluing and clamping, gather the parts together in batches so they are not confused during the assembly process. In some cases, you'll want to make a second dry fit midway through the assembly process, such as when gluing and clamping a stile or rail to multiple slats that have been glued to a stile or rail on the opposite side. This is a necessary evil to ensure that the parts go together smoothly--the parts may have fit the first time you tried them but shifted slightly when they were glued up as a subassembly.

Apply glue to the mortises of two bench legs and on the tenons of one short apron. Use a small wood shim to spread glue on the mortise walls, and use a small brush to coat the tenons. Press together the apron and legs, and then clamp the subassembly to pull the joints tight **(Photo 12).**

Glue and clamp together a pair of bench legs and one short apron. Make two of these subassemblies.

When the glue is dry on these parts, glue and clamp the long bench aprons to the end subassemblies **(Photo 13).** It's best to do this on a flat work surface to ensure that the base assembly is not twisted.

Assemble the table base in the same manner as the bench bases. Make two subassemblies consisting of a pair of legs and one apron. When the glue has set on these, join the subassemblies spanned by a pair of aprons.

Join two leg-apron subassemblies spanned by a long pair of aprons. Glue and clamp this to complete a bench base.

The first stage in assembling a benchtop is to glue and clamp slats to one stile. Use one clamp in the center of each slat.

Now move on to assembling the benchtops. Since there are several slats in each top, assemble each top in stages. First, glue and clamp the slats to one long rail **(Photo 14).** After the glue sets on those joints, apply the opposite rail.

Multiple subassemblies are made in assembling the tabletop. First, slats are joined to the center rail.

Approach the tabletop assembly in the same manner. Begin by gluing and clamping a slat at each end of the center rail. Fill in between these two slats with more slats **(Photo 15).** When the glue is dry on this subassembly, glue and clamp slats to the opposite side **(Photo 16).** Next, glue and clamp the side rails to this subassembly **(Photo 17).** When the glue is set on that subassembly, position clamps across it and then glue and clamp one stile to it **(Photo 18).** Complete the top by gluing and clamping the second stile.

A second set of slats is glued and clamped to the cen
rail. Again, use one clamp in the center of each slat.

Using this technique, you will not have to worry about getting all the parts together before the glue begins to set. Your results will be better, and the stress of a frantic assembly is eliminated.

Glue and clamp a side rail to the center rail. One clamp, carefully centered, should provide enough force.

Mark the benchtops and tabletop for the 45 degree corner cuts, and make these cuts with a sabre saw. Sand the cut corners smooth, then use the chamfer bit in the router to shape the table edges and benchtops. Use the router and chamfer bit to shape the top edge of the umbrella hole as well.

Clamp one stile at each end of the top subassembly. Space clamps evenly and at the center of a tenon.

Rip, crosscut and miter the 1-in.-thick stock to make corner blocks. Bore and countersink pilot holes in each block, and then attach them with screws to the aprons for the table and benches **(Photo 19).**

A corner block is installed at each leg on the table and the benches. A pair of screws holds each block to the aprons.

Invert the tabletop on a padded surface, then place the base over it. Adjust the base so there is an even reveal on all sides of the top, and then attach the base to the top with screws **(Photo 20).** Assemble the benches in the same manner.

Attach the tabletop to the base with several screws. Drive each screw into its matching counterbored hole the apron.

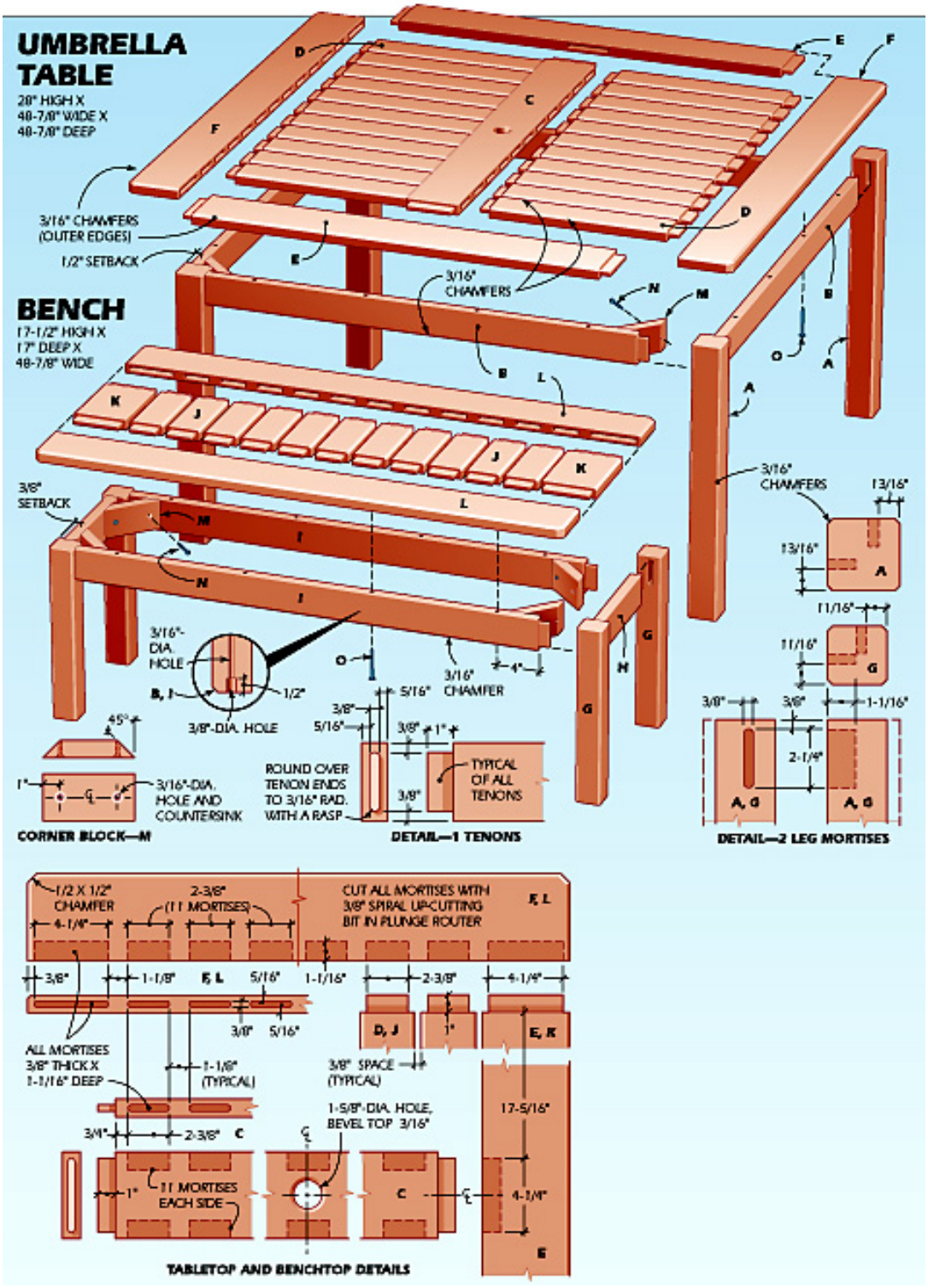
Sand all surfaces with 120-grit and 140-grit sandpaper, and remove all dust with a tack cloth. While cedar is resistant to rot and insect infestation, it will weather if left untreated. To preserve its natural color and protect it from the elements, apply a penetrating finish with a high-quality brush. We used clear (unpigmented) Cabot Decking Stain No. 1400.

A pigmented stain could easily be used on this project. In fact, pigmented finishes provide greater protection against weather damage--even if they do obscure the wood's grain. Although most people prefer white, green or redwood-colored finishes for outdoor wood furniture, there's nothing to prevent you from being a bit more creative. The finish could be color matched to other outdoor furnishings, or to the house itself.

For maximum protection against the elements, use a paintable water-repellent preservative, followed by a compatible primer and topcoat. Visit your paint store to buy these three products and check that they are fully compatible.

MATERIALS LIST--UMBRELLA TABLE AND BENCH		
Key	No.	Size & Description (use)
A	4	2 3/4 x 2 3/4 x 27" cedar (leg)
B	4	1 x 3 x 43 7/8" cedar (apron)
C	1	1 x 5 x 40 7/8" cedar (rail)
D	22	1 x 3 1/8 x 18 15/16" cedar (slats)
E	2	1 x 5 x 40 7/8" cedar (rail)
F	2	1 x 5 x 48 7/8" cedar (stile)
G	16	2 1/4 x 2 1/4 x 16 1/2" cedar (leg)
H	8	1 x 3 x 12" cedar (apron)
I	8	1 x 3 x 44 7/8" cedar (apron)

J	44	1 x 3 1/8 x 9" cedar (slats)
K	8	1 x 5 x 9" cedar (rail)
L	8	1 x 5 x 48 7/8" cedar (stile)
M	20	1 x 2 3/4 x 5 1/4" cedar (block)
N	40	2" No. 8 fh galvanized screw
O	48	3" No. 8 fh galvanized screw



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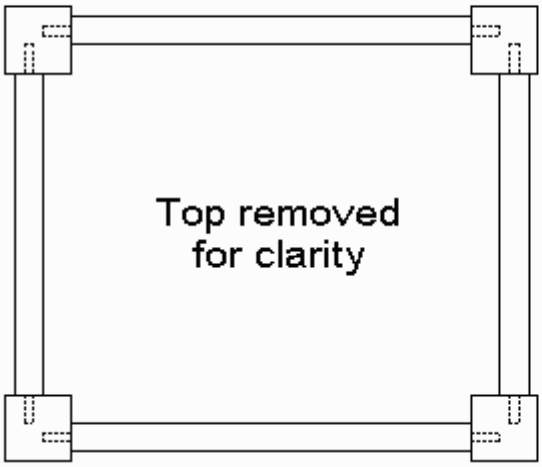
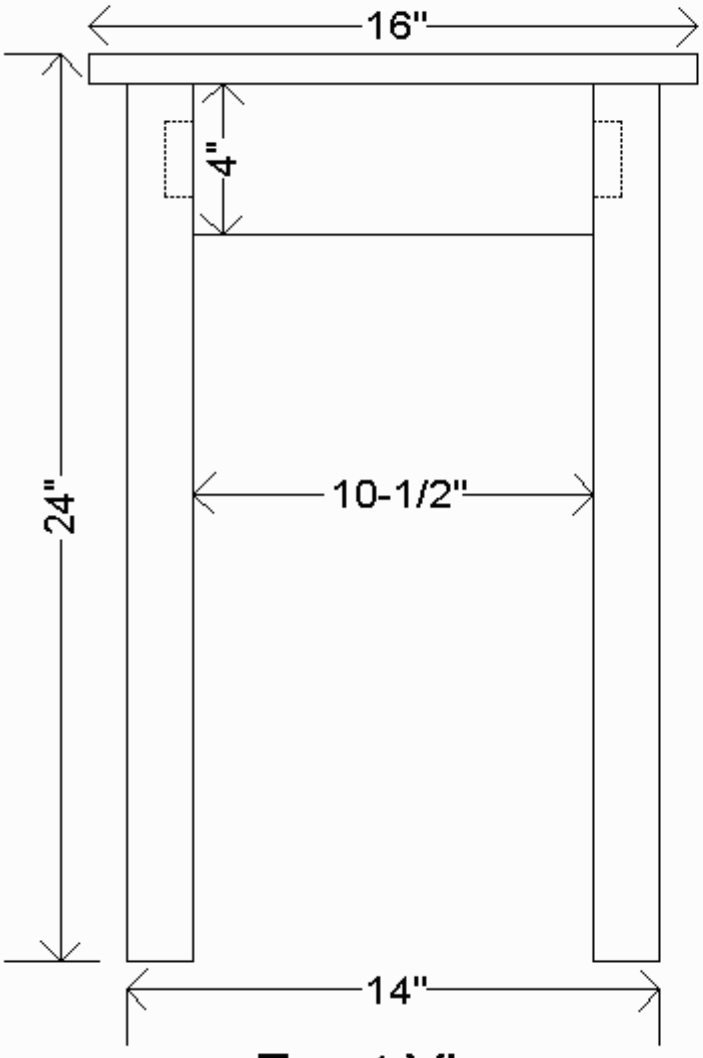
Basic Table

Top View

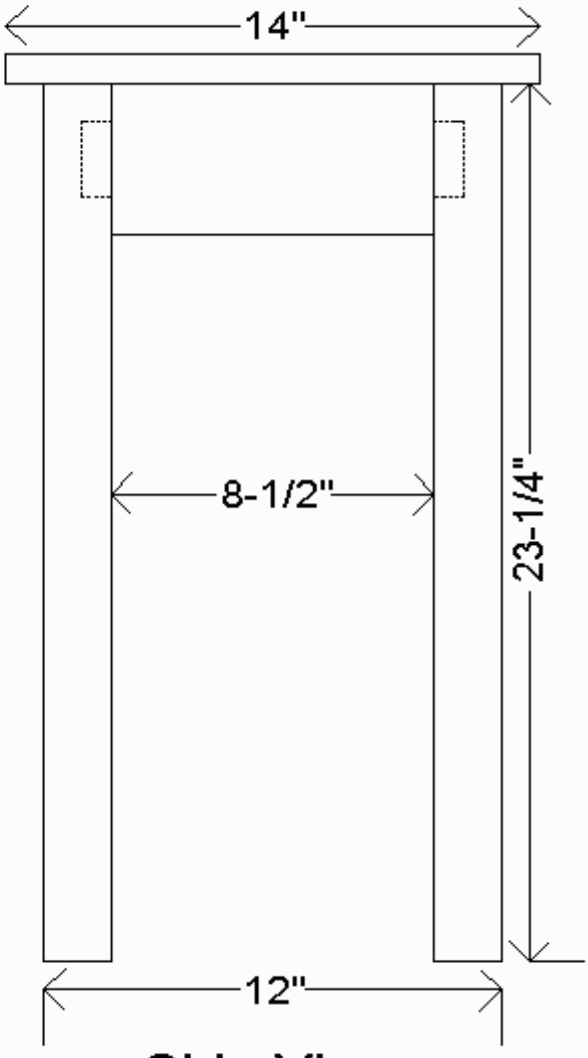


Top and apron are 4/4 stock
(3/4" nominal thickness)

Legs are 8/4 stock (1-3/4"
nominal thickness)



Front View



Side View

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Stock Selection:

Try to get some North American Eastern White pine, probably available up there in Canada. In the states, Idaho pine is a good substitute, because of it's easier tooling and fewer and smaller knots. Home center Ponderosa pine from the North West has much large knots and doesn't hand tool as well.

Because the nominal thickness is standardized, your planing will be limited to mostly jointing & smoothing. Unless you add a drawer, (more good experience) then you'll want to thickness the stock down.

Tool Required:

The basic list of tools needed for this project is small. Some of the variants will require some other tools (see below).

- **Layout Tools**
  A good ruler (tape measure will do) and a very important tool called a square. Get a marking gauge as well.
- **Saws**
  26" Crosscut saw and a 10-14" backsaw.
- **Planes**
  Eventually you'll need a scrub, jointer, and smooth plane too, but you can start by getting a common Stanley #5 jack plane and a fully-adjustable (mouth and blade) block like the Stanley #65 or #18.
- **Chisel**
  Since we will be doing mortises in this project, a 1/4" mortise chisel will be needed. Alternately, a brace with a 1/4" bit and a paring chisel could be used.
- **Stones**
  I won't start an argument over which are better, and yes you can use Silicon Carbide sandpaper to sharpen too. But I will say that without a doubt, Sharpening is the most important skill you must learn. Otherwise most of the above tools are useless, resulting in frustration.
- **Bench**
  Hey, perhaps this should be your 1st project… Make sure you get a good quality and large faced woodworking style vise.

Optional Tools:

These are tools that either make the job easier, or are needed for some of the variants on the original design.

- **Smooth Plane**
  A #3 or #4 is a very handy tool for final smoothing of the parts.
- **Mortise Gage**
  Not strictly necessary, but makes laying out mortise and tenon joints much easier.

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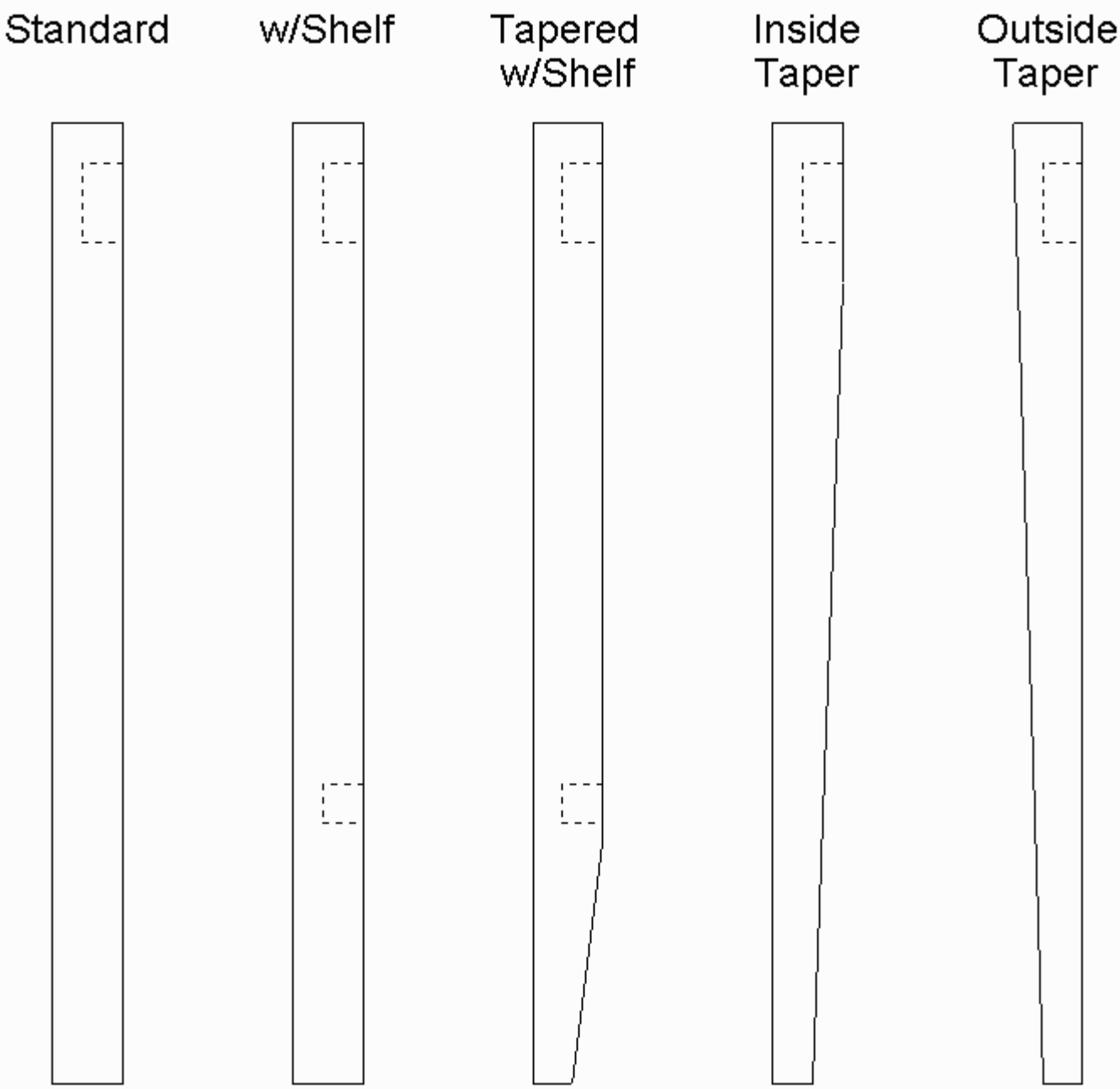
- **Rip Saw**
  If you would like to use tapered legs, a 26" rip saw will make the job easier.
- **Drawknife**
  Another good way to taper the legs is with a drawknife.
- **Spokeshave**
  If you will be using curved aprons, a round-soled spokeshave will be needed to smooth the curves. Either metal or wooden will do.
- **Coping Saw or Turning Saw**
  If you will be using curved aprons, you will need a saw capable of cutting the curves.

Making the Legs

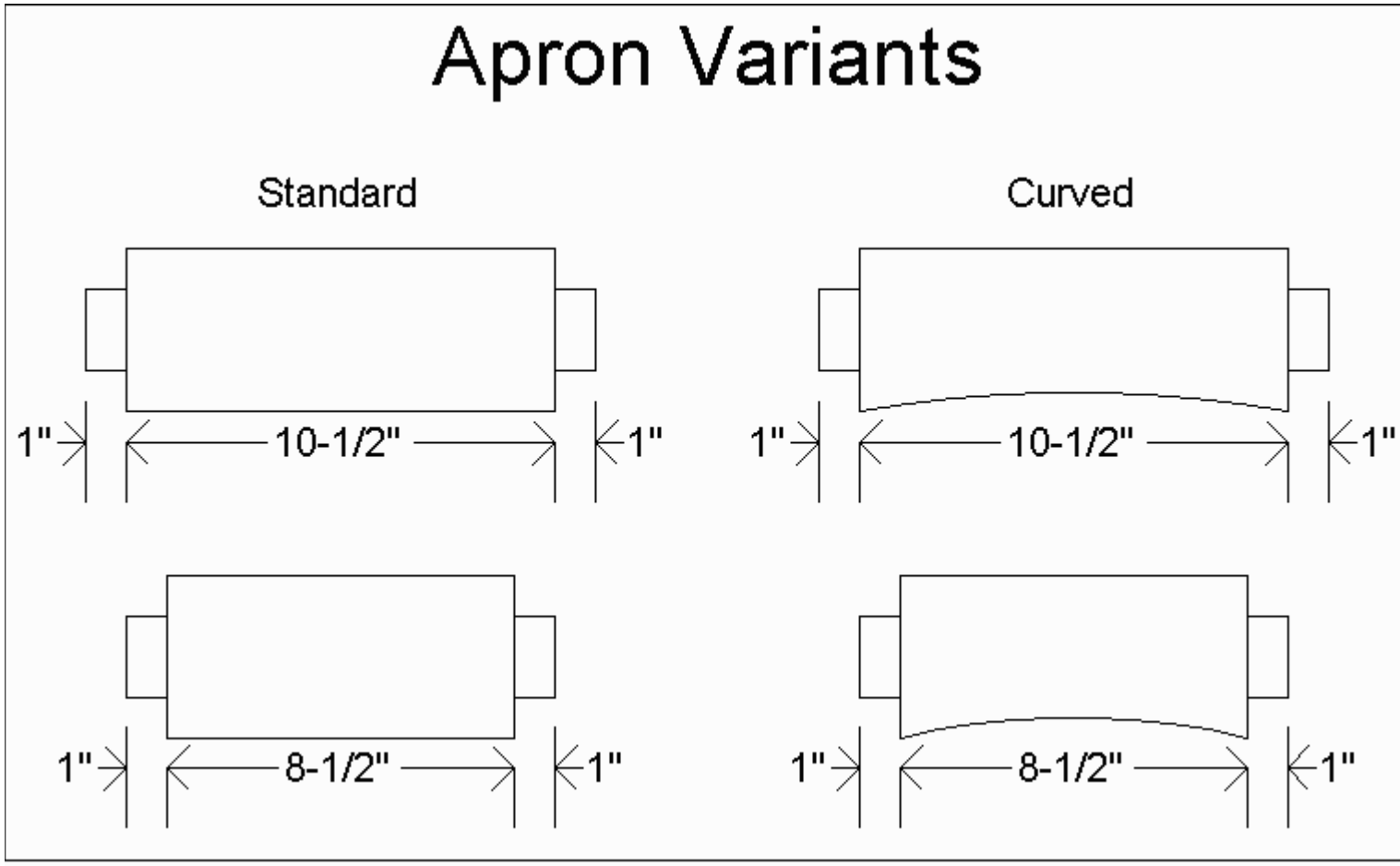
Leg Variants



Start with the legs. Either get 8/4 (actual size 1-3/4") square stock, or joint and glue some up into four usable squares of the desired length. The jack plane should be fully capable of jointing a 24"-30" length. Glue & clamp overnight. Then remove & smooth all four sides.

Now cut the mortises for the rails to join into. Lay them out on those same two "inside" sides of each leg. Mortises should be 1/4" wide and 1" deep, set 1/2" back from the front face. Mortises can be either chopped with a mortise chisel, or bored with a brace and bit and cleaned up with a paring chisel. Either way is pretty simple.

Making the Aprons



Cut your 4/4 (actual size 3/4") stock to *FULL* length and lay out the tenons. Score the tenon shoulders first with a knife or chisel edge. Use your backsaw to remove the cheeks & cleanup with a chisel. If you will be using the curved aprons, lay out and cut the 1/2" deep curve last, and clean up with a spokeshave.

Glue the tenons into their appropriate mortises & clamp the entire assembly together. Check the diagonals and ensure that the entire assembly is square and level (or even on the top).

Making the Top

Normally, the top is probably already glued up & ready to be mounted at this time. But assuming that you didn't multi-task, let's cover making one now.

Saw the boards to length, watching for stock that might twist or cup after glueup. Lay them out and mark the face around each joint for ensure the proper order for assembly. Since this is a basically small project the jack plane can be used as a jointer.

As a newbie, joint the edges two at a time, back to back. This way if you can't plane nice & square, the bevel on Each will offset the other, and your panel will be flat.

Learn during planing to press on the toe upon entry and the heel during exit. This helps avoid rounding down the ends of the board being planed. When you are getting complete shavings for the entire length of the stroke, and the boards join together without any light appearing through anywhere, move on to do the other side of board #2 with board #3.

Glue, clamp, set overnight. Remove, cut to size, clean up. Smooth the top with your jack plane very sharp & set very fine (if you have a smoother, use it instead). Plane the top as smooth as possible, and finish by knocking off the corners with your block plane.

Attaching the Top

When attaching the top, be sure to allow for seasonal movement of the wood!

The easiest method is to put corner blocks in the rails, and attach the top with a couple of small screws in from the bottom. Alternatively, you could use any of the commercial "button" attachments, or use L-shaped cleats which engage a groove in the apron. Any good woodworking book should show several options for this.

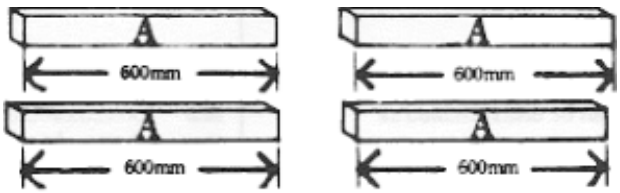
WINE RACK

Here is a rack for one dozen average size wine bottles. Longer or higher racks can be designed using spacing shown but some variation in timber thickness, width, etc., may be necessary.

TOOLS YOU WILL NEED	MATERIALS YOU WILL NEED	
• Hand saw • Hammer • Nail punch • Carpenter's square and pencil • Measuring tape or rule • Drill and bits	**TIMBER** Timber: Seasoned softwood DAR for decorative rack, otherwise sawn hardwood or softwood 1550x25mm, 1piece 75x25mm, 1 piece 2.7m	**HARDWARE** • Hardware • 50x2.9mm bullet head nails • Sandpaper or electric sander.

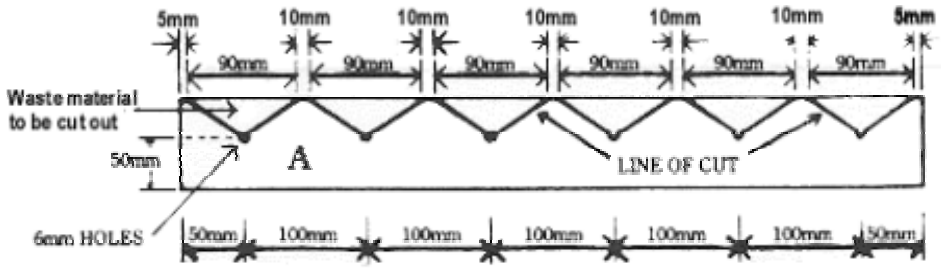
Cut these four rails

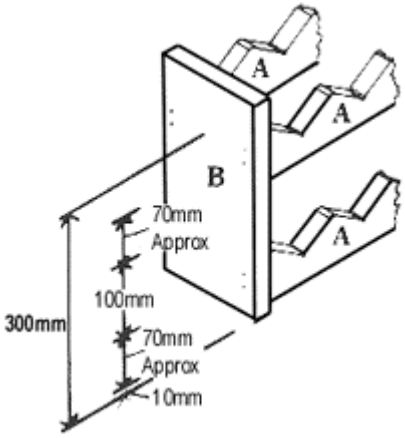
from the pieces 75x25mmx2.7m. Each rail to be exactly 600mm long



Mark out

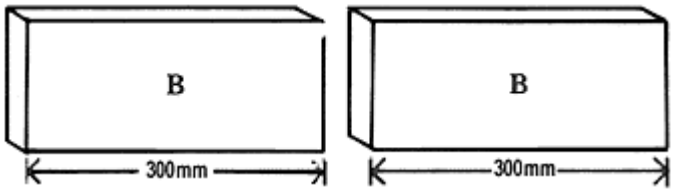
each of the four pieces **'A'** as below. Drill **six** 6mm holes as shown in Step 2, then cut each triangular piece out using hand-saw or jig saw, cutting into the prepared 6mm holes. Smooth off each rail each of the four pieces **'A'** with sand paper or sander.





Cut two end pieces

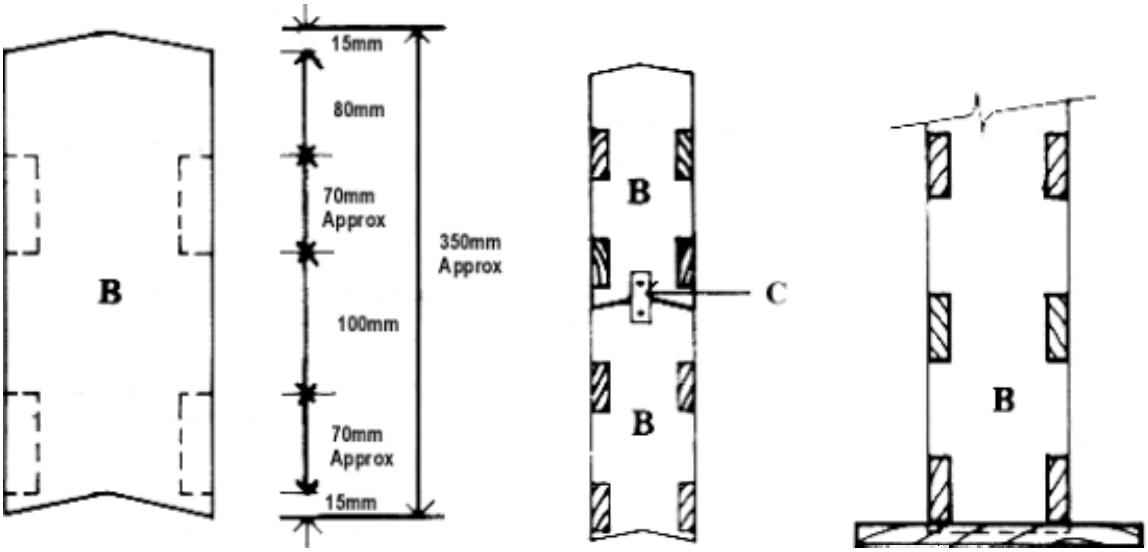
'B' from the piece 150x25x600mm. Each piece should be exactly 300mm long.



Attach rails

'A' to ends **'B'** at spacing shown using two 50x2.8mm nails at each end. Punch nail heads. Not: Pre-drill nail holes but locate to avoid timber splitting and penetration into bottle retaining space. Smooth down, fill nail holes, etc., stian, clear finish, paint etc, as desired.

Design Variations



DEMOUNTABLE RACK

Use screw fastening instead of nailing so that rack can be diassembled as required.

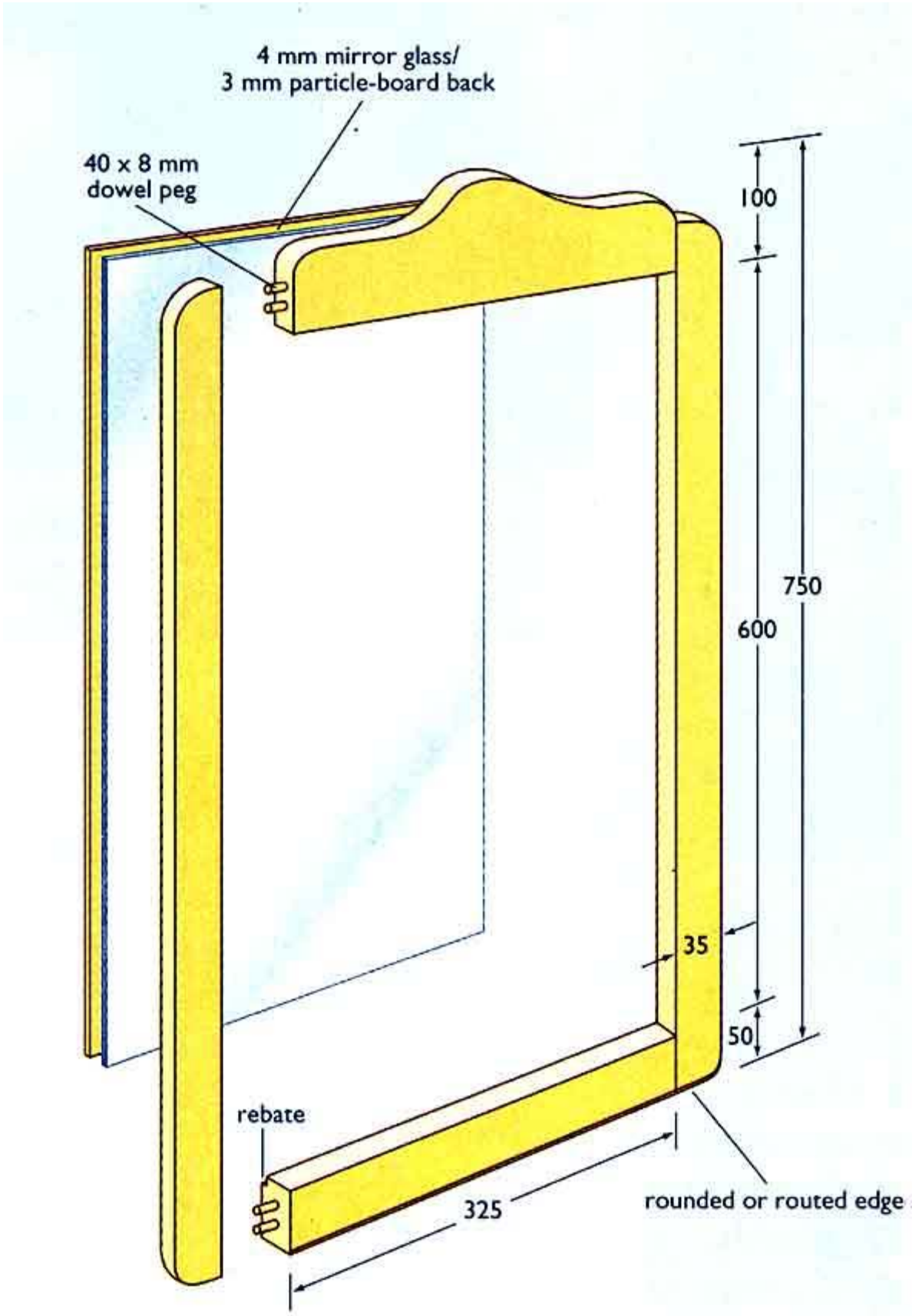
STACKING RACKS

Cut two sides 'B' from a timber piece 150x25x900mm DAR and to shapes shown. Assemble as indicated using location clamp or clip.

TALL RACKS

Very tall racks could be unstable because of height. Use standards or racking design but add a 'foot' to each side of the rack depending on space available. Use an added 'foot' to each side of the rack depending on space available. Use an added 'foot' equal to about normal bottle length. Use, for example, one 'foot' each end, cut to 75x50x300mm DAR.

BATHROOM MIRROR



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You'll need:

Item	Material
mirror frame sides (2)	40 x 19mm timber, cut and planed to 700 x 35mm
mirror frame top (1)	115 x 19mm timber, cut and planed to 325 x 100mm
mirror frame bottom (1)	65 x 19mm timber, cut and planed to 325 x 50mm

You'll also need: 8mm dowel cut into 8 x 40mm lengths; waterproof epoxy resin (if using in bathroom) or PVA glue; mirror glass measuring 342mm x 616mm; 3mm-thick plywood or MDF measuring 345mm x 620mm; 120 grit sandpaper; polyurethane gloss varnish; panel pins.

Here's how:
1. Cut and plane the timber to the correct measurements. Click on the illustration at the top of this story for a full-sized diagram.

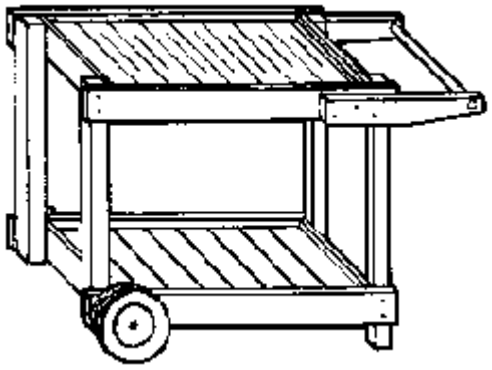
2. With a jigsaw, shape the top piece, making it 50mm high at the ends and the full 100mm height at the centre. Similarly, round off all the corners.

3. Using a router with a straight bit, cut a 10mm square rebate into the rear inside edges of each of the four frame components to take the mirror glass and back. Make the corner joints by drilling holes for two dowel pegs into each one. A dowelling jig will ensure accuracy. Now glue and assemble the frame.

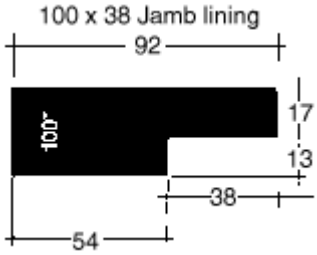
4. You can simply round the front edges of the frame with an electric sander, but for a better trim, rout the edges with a 12mm round-over bit. Sand and triple-varnish frame.

5. Have mirror glass cut to size and fit 3mm-thick plywood or MDF inside the back rebate. Use panel pins tapped into the inside edge of the frame to hold the back in place.

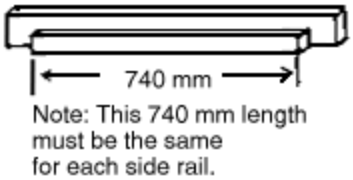
BARBECUE TROLLEY

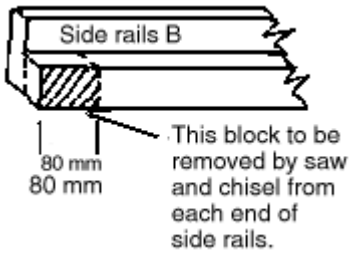


Many of those odd bits and pieces required at the outdoor barbecue can be delivered conveniently on this barbecue (or indoor tea) trolley. Basic design consists of two equal sized flat trays supported on corner posts. However we strongly advise that you decide first on the sort of wheel/axle system since width of trays should be made to fit closely between the wheels. With some changes in details the width of this barbecue trolley can be adjusted to suit your purchased wheel, axle, bracket units. As an alternative you could use a system of bolts and lock nuts, etc to fasten wheels to base tray or corner post as shown later.

TOOLS YOU WILL NEED	MATERIALS YOU WILL NEED	
• Saws • Drill and bit, countersunk bit • Measuring tape/rule • Carpenter's square and pencil • Adjustable spanner • Wood chisel • Hammer • Screwdriver • Chisel	**Timber** Note that this trolley is designed on the assumption that it will be generally protected from exposure to rain and dew. If this limit on exposure is accepted then standard door jamb lining can be used (e.g. from Pacific Maple, meranti, oregon, radiata pine, Tasmanian oak, etc.) and standard or interior quality particle board or plywood would be acceptable for bottom of trays. Corner of posts could be timber selected for appearance rather than for performance under weather exposed conditions.  • 50 mm x 50 mm DAR 4 pieces 750 mm * (4 posts) • 100 x 38 mm door jamb lining (see diagram) 4 pieces 900 mm * (side rails) 4 pieces 600 mm * (end rails) • 100 x 25 mm DAR softwood 16 pieces as bottom planks or use 19 mm particleboard or 12 mm plywood cut to fit frames. • 75 x 25 mm DAR softwood 1 piece 900 mm * (rail bracket) • 19 mm or 25 mm diameter dowel or 1 piece 700 mm for handle/rail * Discuss these length requirements with your supplier, who will supply standard lengths of timber from which these pieces can be cut.	**Hardware** • 8/50 x 6 mm diameter round head wood screws (end rail to post). • 40 mm x 6 mm diameter round head wood screws (side rail to post, handle) • 100/50 x 2.8 mm bullet head nails. (bottom planks) • PVA wood adhesive • 2/150 mm diameter wheeels/axles bracket units as available.

Step by Step





Cut corner posts

From the pieces of 50 x 50 mm DAR timber cut four posts (P) each 750 mm long.

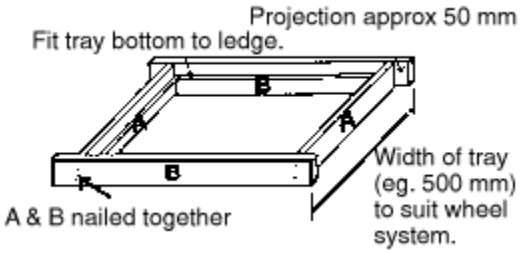
Cut end rails

From the pieces of door jamb cut four end rails (A) each of an exact length to suit the axle/wheel system.

Example: For an overall width of tray of 500 mm cut four end rails each 465 mm long

Mark out side rails

At each end of the four side rail pieces mark out as shown 80 mm from each end. Mark edges as guide for removal of excess material.



Saw and chisel out rail section

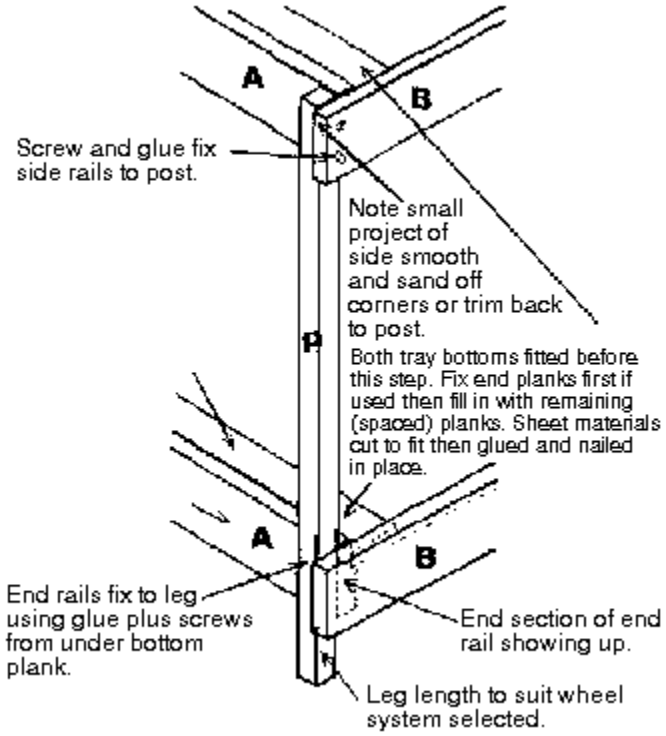
Saw and cut on marked line 80 mm from each end and chisel out excess materials to give four rails as indicated in diagram. Check the dimension shown as 740 mm in diagram. This measurement should be the same for each cut and trimmed rail.

Assemble tray frame

Fit tray rails together and fix in position using nails. Check squareness of trays and confirm that the two trays are the same size. Trim rails and adjust where necessary.

Cut bottom planks

Measure internal width of tray as shown in previous diagram. Cut 16 bottom planks to this length or cut particleboard or plywood to fit in as tray bottom.

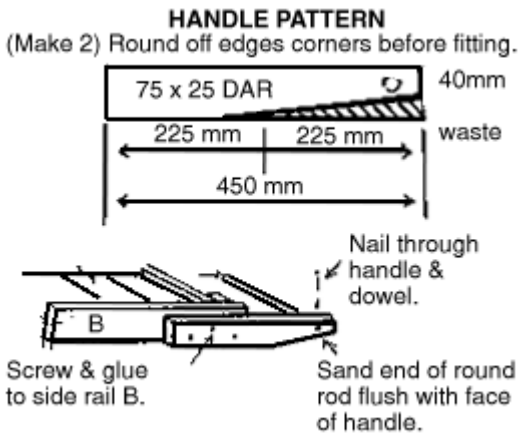


Square up trays

Fit a bottom into each tray and fix in place using glue and nails. Before final fixing square up tray and check that the two trays are of the same size.

Attach legs

Fix trays to the four legs as shown in diagram below using glue and screws. Note that the final length of each pair of legs will depend on wheel/axle bracket system used. However, in this initial assembly, the four posts are of equal length such that the overall height remains at 750 mm. The distance between trays maybe varied depending on the wheel and axle system chosen.



Fix wheel system

Note: The assembly could stand on four legs until the wheels are attached to the front of the units, or the front 'legs' are removed first as appropriate for selected wheel assembly. Fit selected wheel/axle system. Cut off excess front legs as required.

Provide drainage holes

If sheet products (particleboard or plywood) are used in trays, provide drainage holes (9mm 3/8" diameter in each corner. Loose fitted plank bottom if used should give adequate drainage.

Smooth and rounding off

Using sanding disc, sander or hand sanding or planing, smooth and round off all accessible sharp corners and edges of the trays and posts. Punch all nails if desired and fill nail holes with putty/filler the same colour as timber.

Note: The trays could have side rails projecting 5-10 mm beyond posts. These projections should be rounded off thoroughtly, or trimmed off.

Cut, trim and fix handle

< From the piece of 75 x 25 mm DAR x 900 mm cut two handles each 450 mm long. Trim or shape as in diagram, smooth all corners and edges, then screw - and glue-fix to rear end of upper tray as in diagram.

Note: To make sure that handle fits flat to the rail you may need to chisel out small pieces of the handle where it comes into contact with the heads of screws into posts or use countersunk screws.

Cut to length and insert broom handle/dowel. Use glue in hole and drive in one 30 mm long nail through top edge of shaped timber piece into handle/dowel.

Apply finishes

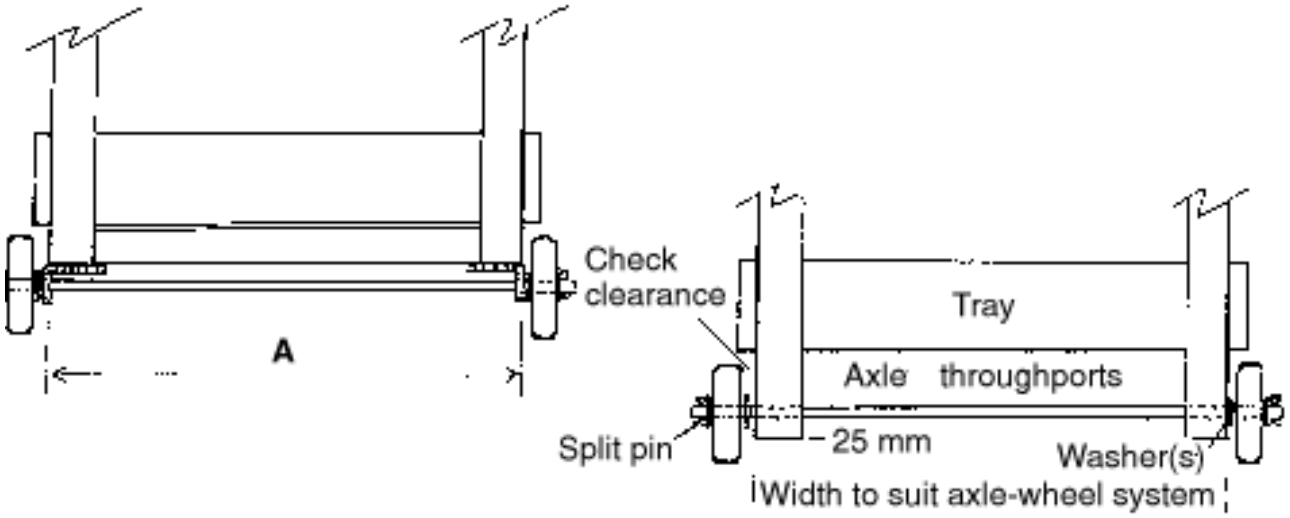
Clear finish with three coats of satin clear polyurethane finish, or selected stains, or garden furniture finish or conventional paint finish. It is strongly recommended that the trolley receive a thorough coating of one of these finishes and that this coating be maintained adequately.

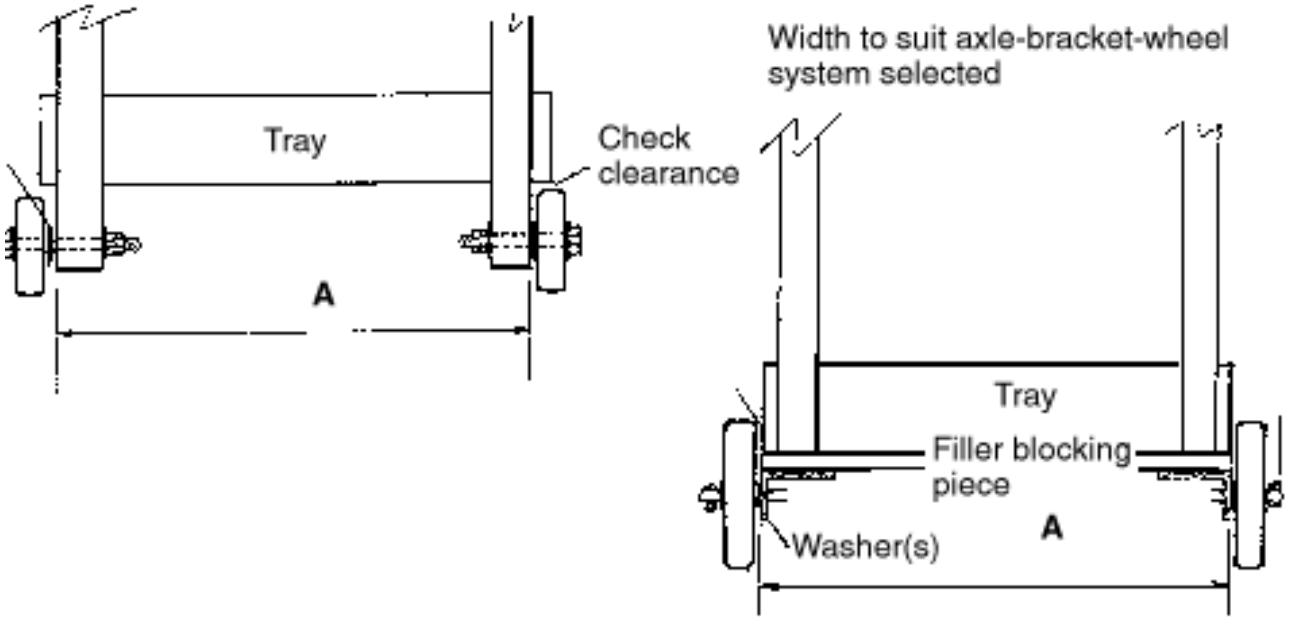
For weather exposed trolleys

If the trolley is to be exposed to weather for long periods, then be selective about materials. For timber components for example select 'durable' or moderately durable timbers such as western red cedar, jarrah, black butt etc. or preservative treated timber, OR pay particular attention to applying exterior finishes (and then maintenance) to low durability timbers. Fastenings (nails, bolts, etc.) should be non-corroding such as hot dipped or electroplated galvanised coatings.

Alternative wheel/axle systems

Dimension 'A' adjusted to suit your system
Check wheel clearance from tray side





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CABINET BATHROOM

Start At the Top

The first thing I needed was a moulded sink top. It measured 19" x 31" and was the starting point for the project.

My design includes what I call extended cabriole legs on the front, creating an elegant, old-fashioned look. I used sugar pine for these legs. It's a little harder than eastern white pine, but it's still easy to work with. The outline of the 1/4"-thick hardboard template I made for the leg profile is on this illustration.

Creating cabriole legs is within the reach of most woodworkers. The plans include step-by-step directions. The technique is quite straightforward but you'll need access to a bandsaw and the patience to sand the inside and outside curves that form each leg. This is where pine makes life easier than hardwood.

Once you've got two front legs and the straight back legs done, it's time to tackle the side panels. Although most bathroom cabinets are 32" tall, I went with 36". This is reflected in the materials list. To shorten this cabinet to a standard height, reduce the side stiles, door stiles and upper portion of the legs by 4".

The plans show the stiles and rails joined into a frame with #20 biscuits. The panels fit into the inside face of this frame, within 1/4"-wide x 3/8"-deep table-routed rabbets you make after the frames are dry and sanded flat.

The next step is to install the side panels, but two things must happen first. The edge of the panels needs to be routed to fit the 3/8" rabbet you routed in the frame. The four rounded corners of the frame rabbet must be squared with a sharp chisel. Secure the panel with 1/2" finishing nails or wood trim on the inside face of the side frame. This is the same design and construction process I used to build the face frame, door and drawer frames. Build these parts now. Sand them flat, then rout a round-over profile on the outer edges of the drawer face and doors.

Bring the Cabinet Together

Creative cabriole legs cut from a template refine the vanity's stance and give it a furniture-like appeal

Sillaot's trademark drawer slides function beautifully but require an eye for precise tolerances

With the side and face frames done, it's time to join them to the legs. I used screws driven into angled pocket holes. This is fast, easy and allows me to assemble the whole cabinet without waiting for glue to dry.

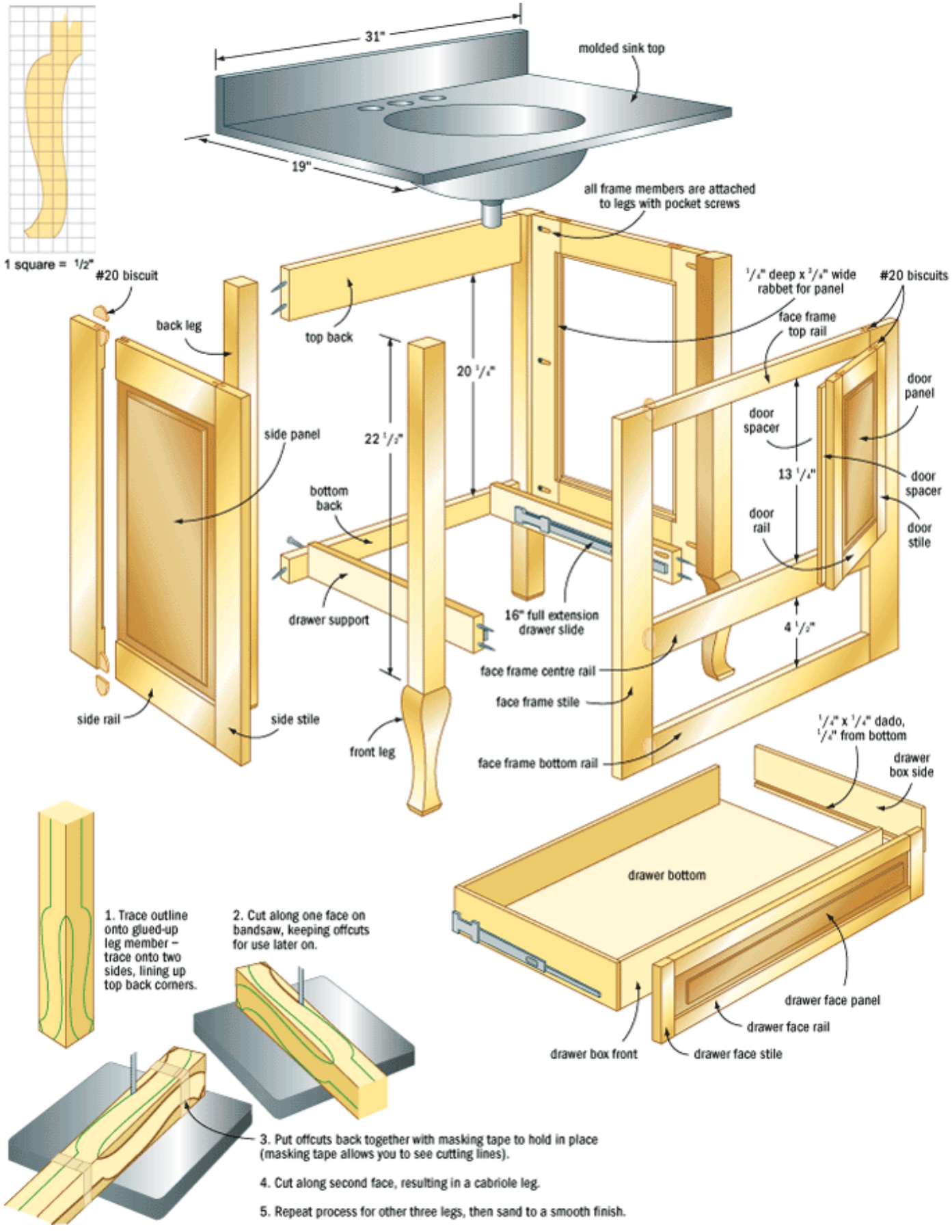
When the cabinet is assembled, including the two back support members, you can measure the opening for your drawer box. Mechanical slides like the kind I used require a specific drawer-to-cabinet clearance—usually 1/2" on each side. That's why you should measure your drawer opening and make changes to the drawer specs if needed. Construction variations can easily throw dimensions off 1/8"—more than enough to make mechanical drawer slides perform poorly. The plans show how the drawer support rails provide a surface for the mechanical slides to fasten to.

I kept things simple with butt joints at all four drawer box corners. The drawer bottom fits into 1/4" x 1/4" dados in the sides, front and back. Install the drawer in its opening on the slides, then temporarily fasten the frame and panel drawer face to the drawer box with four screws driven from inside the box. Take the drawer face off for finishing.

Final Steps

Minwax pre-stain wood conditioner was used to even out the absorption of the Ipswich Pine stain. The stain was sealed under three coats of oil-based urethane. Once the finish is complete, seat the sink top on a bead of silicone applied along the top edges of the cabinet. Screws driven through the top and bottom back members and into wall studs will secure it to the wall. Hook up the plumbing and you're ready to go.

For the Cabinet	Material	Size	Qty.
Front legs	sugar pine	4" x 4" x 36"	2
Back legs	sugar pine	2" x 2" x 36"	2
Side rails	pine	3/4" x 2 1/4" x 9 3/4"	4
Side stiles	pine	3/4" x 2 1/4" x 22 1/2"	4
Side panels	pine	3/4" x 10 7/8" x 18 3/4"	2
Face frame stiles	pine	3/4" x 2 1/4" x 22 1/2"	2
Face frame top rail	pine	3/4" x 1 1/4" x 20 5/8"	1
Face frame centre rail	pine	3/4" x 2" x 20 5/8"	1
Face frame bottom rail	pine	3/4" x 1 1/2" x 20 5/8"	1
Drawer supports	pine	3/4" x 2 3/4" x 16 1/8"	2
Top back cross member	pine	3/4" x 4 1/2" x 25 1/4"	
Bottom back cross member	pine	3/4" x 2" x 25 1/4"	1
Sink top	molded acrylic	19" x 31"	1
For the Doors			
Door rails	pine	3/4" x 1 3/4" x 7"	4
Door stiles	pine	3/4" x 1 3/4" x 14 1/2"	4
Door panels	redwood	3/4" x 7 5/8" x 11 5/8"	2
Door spacer	pine	1/4" x 2" x 13 3/8"	1
For the Drawers			
Drawer box fronts	birch-veneer ply	1/2" x 4" x 18 5/8"	2
Drawer box sides	birch-veneer ply	1/2" x 4" x 16"	2
Drawer bottoms	birch-veneer ply	1/4" x 15 1/2" x 19 1/4"	1
Drawer face rails	pine	3/4" x 1 3/4" x 18 1/4"	2
Drawer face stiles	pine	3/4" x 1 3/4" x 5 1/2"	1
Drawer face panel	redwood	3/4" x 2 5/8" x 19"	1
Drawer slides	full-extension	16"-long	2
Drawer/door knobs	white porcelain	1 1/8" dia.	4



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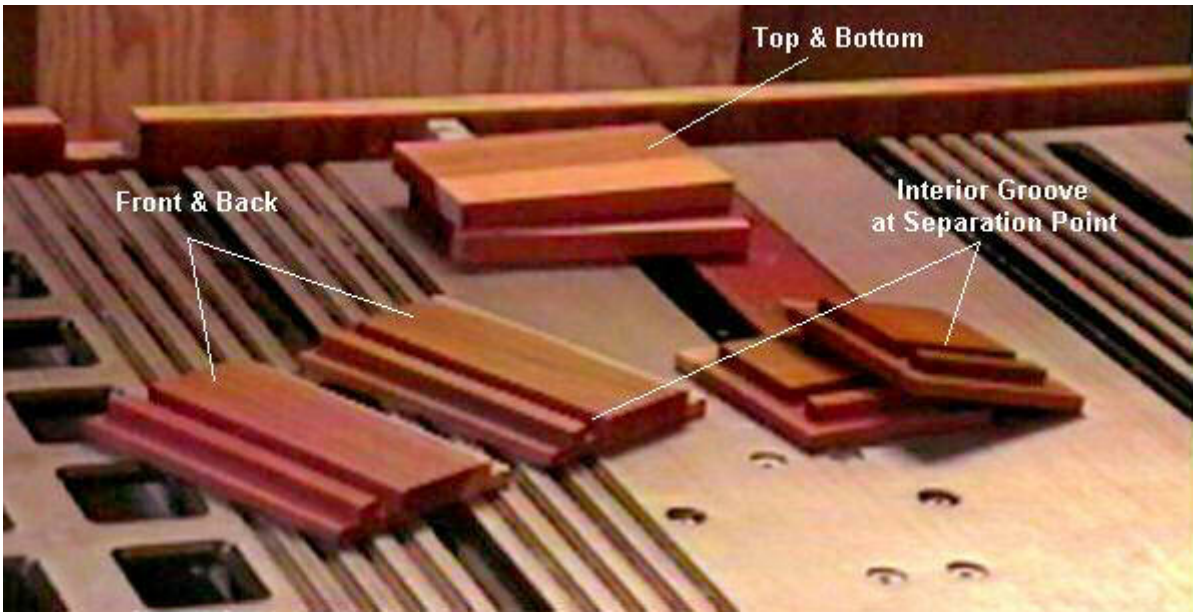
SMALL BOXES

The box can be made from any 3/8" wood.

Some exotic wood seems usually to come in 3" x 24" pieces so that kind of dictates the size of your small box. So I cut 4 pieces 4 1/8" long for the front, back, top & bottom, and 2 - 2 7/8' for the ends. I was left with a piece no more than 5/8" as scrap because of wastage due to the thickness of the saw cuts. Set the pieces which will be your top and bottom aside till later.



ROUTING THE RABBETTS & GROOVE

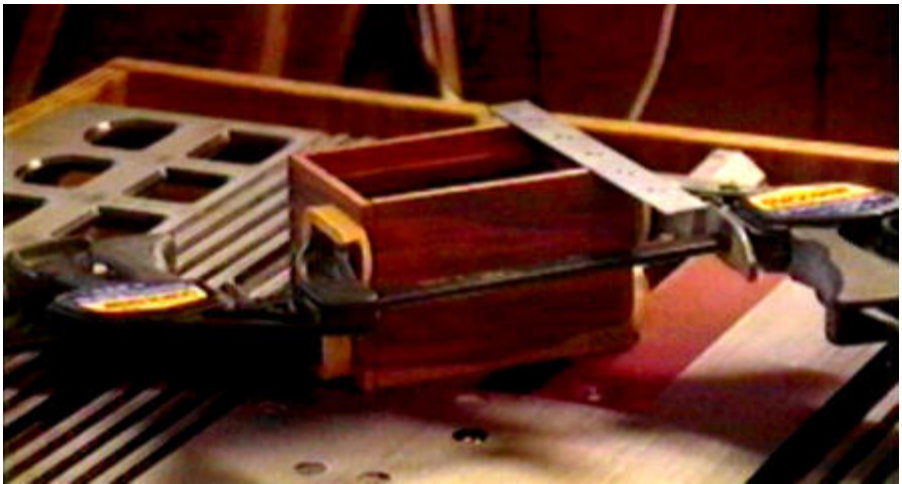
On the front, back, and end pieces, cut 3/8" rabbetts, about half the thickness of the stock deep, (with a 3/8" straight bit) lengthwise ONLY along the inside of the TOP AND BOTTOM EDGES ONLY. On your end pieces ONLY, cut 3/8" rabbetts across the inside of the other two edges.

Move your router's fence away from the bit about 1/4" and leaving your router's 3/8" straight bit at the same depth, rout a groove length wise on these 4 pieces. This groove will become a necessary element of the way the top fits on the finished box.

For more details, see drawing below.

IMPORTANT With a soft lead pencil, mark a line end to end, on the outside of these 4 pieces indicating where the bottom edge of your interior groove is - once your box is glued together you need to know where that bottom edge is.

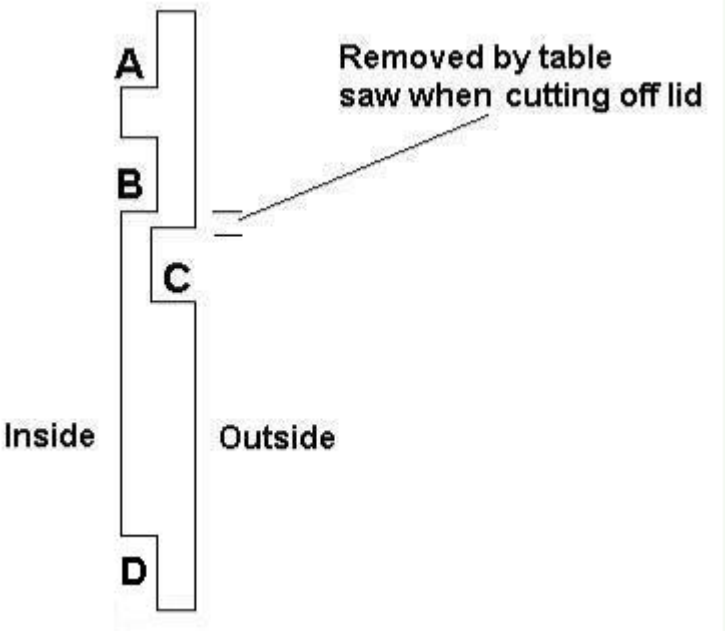
Mark it end to end because you may be rounding over ALL edges and small markings may be cut off



Dry assemble your box and holding it together with some light clamp pressure, measure carefully for the width you need to cut your top and bottom. Oversize your top and bottom if you're unsure of

an exact fit. You can always take a tad more off but you can't put it back.

BE CAREFULL! THIS PIECE WILL BE CUT TO ONLY APPROXIMATELY 2 1/2" WIDE. KEEP YOUR FINGERS AWAY FROM THE BLADE AND USE A GOOD PUSH STICK AND FEATHERBOARD TO PROTECT YOUR HANDS! IF YOU DON'T FEEL COMFORTABLE MAKING THIS CUT, GET SOME HELP FROM SOMEONE WHO IS!



Use LOTS of clamps and glue your box together. When dry, you will make another cut with your router but this time on the outside of the box and just a bit deeper than you previously were using. Position your box against the fence and line up your 3/8" straight bit so that it will make a cut just below the line which you marked on the outside of the box. Leave a small space between the line and the edge of your bit. This is all that will be holding your box together and you must be sure of the placement of this groove for safety reasons, so be sure to measure correctly!

PROFILING THE EDGES

Now we can do the profiles on the edges you choose using a 1/2" round over bit. I decided to do just the top front and top back, but different "looks" of baxes can be attained by selective choices of edges to be routed with the 1/2" roundover bit, for instance another attractive box has all edges rounded over. Another has just all four top edges rounded over.

LOCATION OF GROOVES

This profile shows the location of the grooves & rabbetts. When you are sure you've got your bit positioned properly for this cut (C), extend your bit just a bit and make your exterior groove. If you wish, you may want to make a couple of shallower passes to insure a clean cut.

For a nice fit of the lid to the bottom, just be sure you extend the bit just a very small amount, like 1/32". Extending it too much will make for a sloppy fit. Not enough may be too snug.

CROSS SECTION DRAWING EXPLANATION

- "A" is the top rabbett on the inside which accepts the top
- "B" is the interior groove which along with the exterior groove "C", forms the mating edges for the 2 sections (top & bottom) of this box

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- **Note the location of the saw kerf. When cutting off the top, most of the wood which was left between the inner and outer grooves, will be cut away as the lid is cut off. This edge will probably need a bit of cleaning up though for a proper fit before finishing.**
- **"D" is the bottom rabbett on the inside which accepts the bottom**

CUTTING THE TOP OFF

Now it's time to cut off the top of your box. You could do this with a Japanese draw saw, on your table saw ar with an Exatco blade. I think this task is best accomplished using your table saw,,, I find less clean up needs to be done afterward that way. No matter how you do this, you will have to clean up this area later with a sander or by hand sanding and/or an Exacto knife.

Here's how I do that job on a table saw. Start with the cuts to the ends of the box first. Turn your box on it's end and position your saw's fence so that the blade will make it's cut adjacent to the line you marked on the outside of the box. Set your blade height to just higher than the thickness of the wood and so that it *just takes off the line,* and make your cut on each end.

***BE CAREFUL!!! THIS STEP MUST BE DONE PROPERLY TO AVOID INJURY BY KICKBACK AND/OR RUINING YOUR PROJECT!* Insert a small piece (1" x 1") of 1/8" thick wood into each kerf or cut, and using masking tape, tape these pieces securely to the top and bottom to keep the kerfs open thereby avoiding any problems. You must be sure this arrangement is secure for safety's sake. It's worthwhile noting that your taping must be done so that when you make this next cut, you won't be cutting through your tape job.**

Without changing the blade setup in any way, turn the box on it's side and make the length wise cut to the front and then to the back. When all cuts are completed, remove the tape and those small 1/8" thick spacers.

FINAL CLEANUP AND FINISHING

Using sand paper, carving knife, chisel or any other tool you prefer, clean up your project and fit the top to the bottom of the box. It should go on and off easily, but not sloppily! Sand the project with 80 - 120 grit sand paper and then 220 grit, and finish with a top coat of your choice. I used a clear satin finish spray lacquer.

BASIC BOARD FENCE

Instructions

Fig. 1

1) Prepare and Set the Posts
Coat the ends of each post with a waterproof deck sealer (Fig. 1).

Dig holes for and install the corner posts first, setting them below the frost line and on a 6-inch tamped bed of crushed rock or gravel so their end grain does not sit in water.

Next, stretch a taut mason's line between the corner posts to help locate the intermediate holes and posts; try to space them evenly about 6 feet apart.

Gradually backfill each hole with soil and tamp every four inches. Then fill the area around the posts with a well-tamped mix of earth and gravel or with concrete for extra strength at corners and gate openings. Check for plumb.

Fig. 2

2) Mark the Lower Fence Rail Position on the Posts
Establish a level for the lower rail at least a few inches above the ground and, on each post, mark placement for the top and bottom edges of the lower rail. (Fig. 2)

Fig. 3

3) Cut the Posts to Accept the Lower Rail
Between the marks, make several kerf cuts 1-1/2 inches deep with a circular saw. Chisel out each post to accept the rail. (Fig. 3)

Fig. 4

4) Join the Lower Rails at Corners
At the corners, inset intersecting rails and screw them in place (after predrilling to avoid splits) with galvanized deck screws. (Fig. 4)

Fig. 5

5) Affix an End Post to the House, If Necessary
If your fence will meet the house, fasten an end post to your home's siding. Make sure the post is plumb; you may need to insert spacers or shims if the siding is irregular or slanted. (Fig. 5)

Fig. 6

6) Adjoin the Upper Rails
Center the joint between upper rails in the post notches, then predrill the rails before screwing them to the posts. (Fig. 6)

Fig. 7

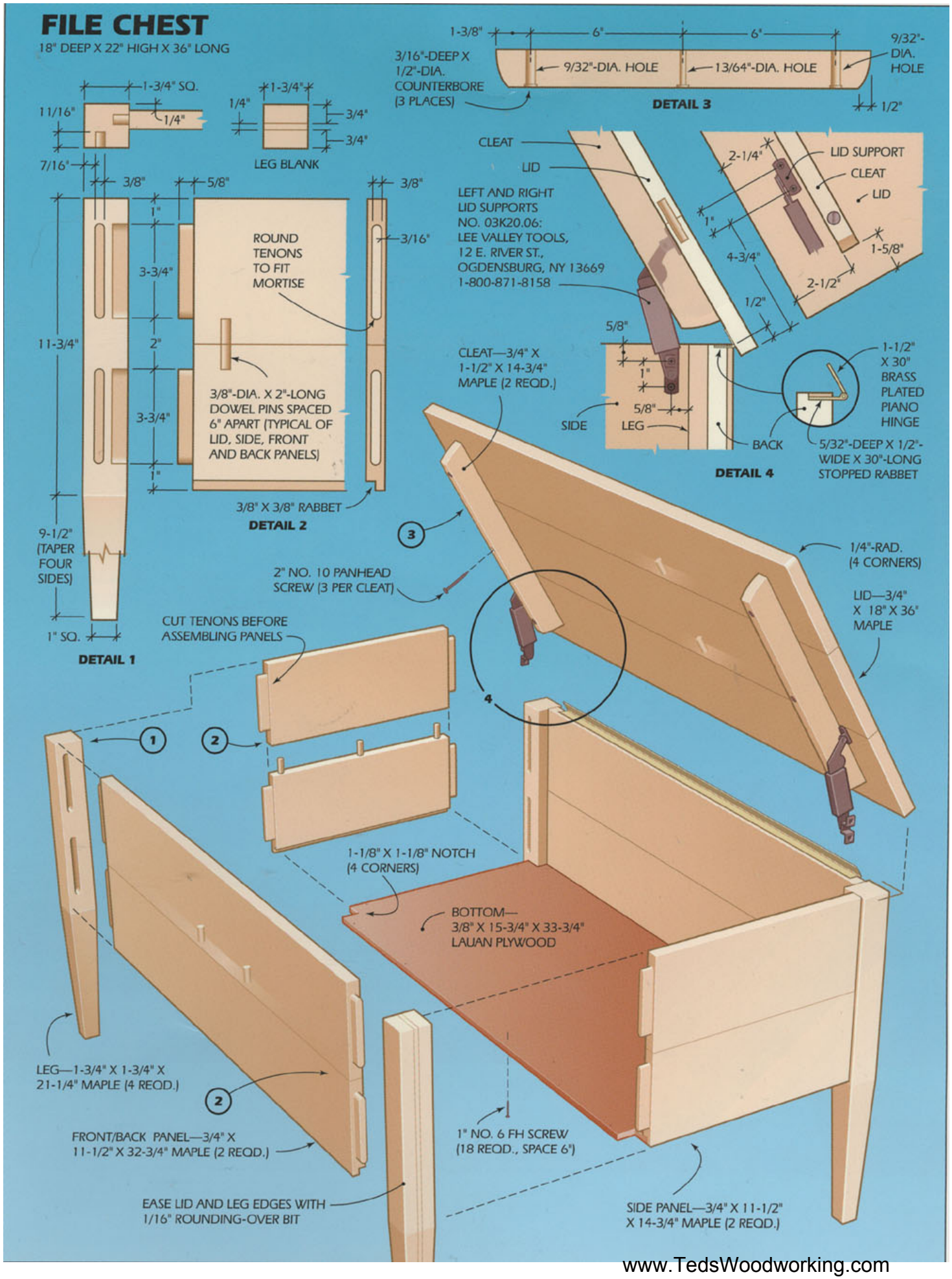
7) Install the Pickets
Cut a 1/2-inch spacer to simplify installation of the pickets. Periodically check for plumb as you work along the rails. (Fig. 7)

Fig. 8

File Chest

FILE CHEST

18" DEEP X 22" HIGH X 36" LONG



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Making Panels

To get started, rip and crosscut the stock for the front, back and side panels to the sizes indicated in the accompanying drawing. For the top, cut all three boards about 1 in. oversize in length. The two outside boards are cut about 1/2 in. oversize in width while the center board is cut to the 6-in. finished width. This allows for trimming the top to size.

Arrange the boards back to back in a vise and, using a square, mark the dowel centerlines across both edges. Then, always working the same side of a doweling jig to the face of the workpieces, bore the dowel holes.

The end tenons on the side panels must be cut before the paired boards are edge glued. For best results, add an auxiliary fence to the saw's miter gauge, and clamp a stop block to the fence to ensure that the rabbet cuts are of uniform size. Using a dado blade, make a cut on the face of the workpieces. Then raise the blade to project 1 in., and pass each board over the blade on edge to form the tenon.

Prepare for edge gluing by readying three bar or pipe clamps, four small clamps and four cauls. Apply paste wax to the cauls so they don't get glued to the panel. Tap the dowel pins into their holes and then apply glue to the panel edges (Photo 3).

Join the pieces. Then alternately apply pressure to the bar clamps and to the caul clamps to close the joint and to keep the panel from buckling.

Use a belt and finish sander to dress the panel faces. Then use a 4-in. hand file or a chisel to round the tenons.

To complete the panels, cut the rabbets for the bottom Next, use a router with a straight bit to cut the hinge rabbet. Then switch to a 1/16-in. rounding-over bit to ease the panels' exposed edges.

Making The Legs

Make the legs from two 45-in.-long blanks, which you'll later cut into four finished

Mark each leg mortise with centerlines 3/8 in. apart, and then bore the mortise holes. Trim the mortise to finished dimension.

lengths. The legs require that three pieces of wood be glued together. The center piece is sawed from a thicker piece. Be sure to use a smooth cutting blade, the saw's antikickback splitter, a feather board and a pushstick for this operation.

Glue and clamp the leg pieces (Photo 8). To keep the pieces from sliding out of alignment during clamping, bore two 3/32-in. holes in the ends of the blanks, and use 2-in.-long finishing nails as alignment pins. The pins are inserted in an area to be cut off.

Mark the mortise locations on each leg, and be sure to arrange the legs so that the surfaces showing the glue joint face the chest's ends.

Use a jig to cut the leg tapers. Place the leg between the rear stop and the front notched block, and make two cuts. The notched block is tack nailed so it projects 1 in. from the guide board. Make a taper cut on two adjacent faces, and then reposition the block so the notch projects 1-3/8 in. Cut the remaining tapers.

Then use a router to ease their corners

Assembly

Before gluing the parts together, make a dry assembly to prepare the necessary cauls. Check the clamp adjustments and the fit of parts.

Do the gluing in two stages. Apply glue only on the short end panels and legs. Then make a temporary complete assembly. When the glue has dried, remove the clamps. Then glue and clamp the long side panels to the preglued end subassemblies.

Cut the bottom panel to size and attach it with screws.

Trim the top to size. Rip and crosscut its cleats, and bore the holes in them. The two outside holes are oversize to permit the lid to move with changing humidity.

Bore the pilot holes for the hinge, lid supports and cleats. First, install the hinge at the back, then lay the table on its back to join the second leaf of the hinge to the lid. Attach the lid support in the same manner (Photo 14). Attach the cleat with screws only, not glue.

After finish sanding, we applied three coats of clear satin polyurethane. The first coat was tinted with yellow ochre universal color, available at art supply stores.

FIRE PLACE MANTLE

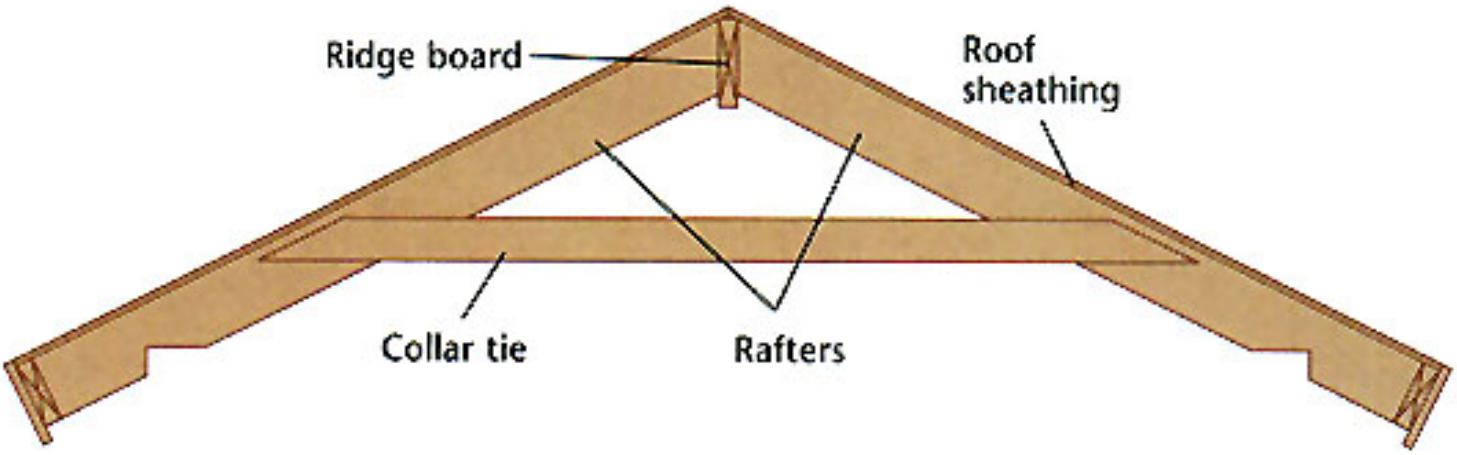
1. Cut a 1x8 for the front plate to the length of the hearth opening. Cut a 1x6 piece one inch longer than the length of the 1x8. Use a router table and a chamfer bit to bevel a 1/4-inch detail along the edge and sides of each piece. Connect the two pieces at a ninety-degree angle with wood glue and finishing nails.

2. Cut and attach small triangle supports where the pieces meet, which add extra strength to the top and provide a place for a piece of crown molding to rest (**figure A**). Make the angled trim molding using the router table and chamfer bit by running each long edge over it. The trim will later be centered between decorative end brackets (**figure B**).
3. To make the decorative brackets for each end, first sketch the desired design on a piece of paper to use as a template. Put double-sided tape between the two pieces of lumber so they can be cut at the same time so they're identical. Trace the design onto the lumber and cut it out using a jigsaw with a scroll blade attached (cut as close as possible to the line). Sand the pieces smooth using the pencil lines as a guide and separate the boards.
4. To build up the top shelf, cut a 1x8 with a 1-1/2-inch reveal and make the same routed bevel on the edges. For more interest, add square drawer pulls along the front plate. Place the entire assembly against the wall; secure it using wall anchors and hide the screws with button caps.
5. Caulk around the edges; prime and paint the piece as desired.

Figure A

Figure B

ROOF FRAMING



A roof frame is an important structure not only because it supports the roofing and helps keep the building dry, but because its style and shape have a great impact on the character of the building, the feel of the interior space, and the amount of storage space available.

There are four common roof types shown in this book. A *gable* roof is the classic, triangular design, with two sloped sides meeting at the peak, and flat ends (called *gable ends*). *Gambrel* roofs are like gable roofs with an extra joint on each side, resulting in two different slopes. A *hip* roof is structurally similar to a gable, but has no gable ends. *Shed* roofs are the simplest style, with only one sloped plane. They can be built with frames or, for small structures, a sheet of plywood.

All of these roof styles have a designated slope, which is the degree of angle of each side. The slope is expressed in a ratio that states the number of inches of vertical rise per 12" of horizontal run. For example, a roof that rises 6" for every 12" of run is said to have a slope of 6-in-12. Roof slope is indicated in plan drawings by a triangular symbol known as the *roof-slope indicator*. You'll use the roof slope to lay out rafters and fascia.

In standard roof framing, rafters are the principal structural members, rising from the walls to theridge board (or *hub*, in gazebos) at the peak of the roof. Rafters in outbuildings typically are made from 2 × 4s or 2 × 6s, are spaced 16" or 24" on center, and are installed perpendicular to the length of the building. To keep the roof planes from spreading apart, *rafter ties*, or *collar ties*, are nailed between opposing rafters to form a structural triangle. With shed-style roofs, the rafters span from wall-to-wall and no ridge board or ties are needed.

The key to successful roof sheathing framing is making accurate cuts on the rafters. Take your time to cut the first two rafters, making any necessary adjustments, then use one as a pattern for marking the rest. The following project shows you how to cut and install rafters in a gable roof frame, but the basic procedures are the same for gambrel and hip roofs.

As an alternative to rafter framing, you can take your plans to a truss manufacturer and have custom trusses built for your project. However, this will cost you more and probably will limit your storage space: the internal supports in truss frames leave little room for storage.

TOOLS & MATERIALS	
Circular saw	2 × lumber
framing square	8d, 10d, and 16d common nails
4-ft. level	

A speed square is a handy tool for marking angled cuts—using the degree of the cut or the roof slope. Set the square flange against the board edge and align the PIVOT point with the top of the cut. Pivot the square until the board edge is aligned with the desired DEGREE marking or the rise of the roof slope, indicated in the row of COMMON numbers. Mark along the right-angle edge of the square.

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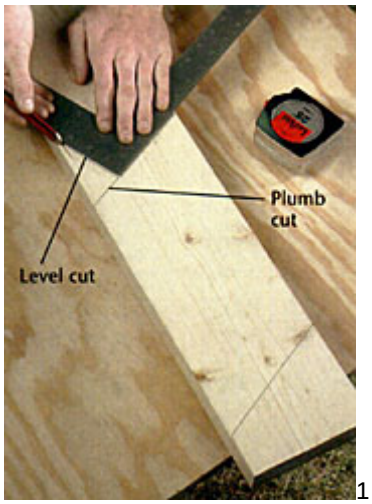
HOW TO BUILD A ROOF FRAME

Note: The following instructions are based on the sample rafter template shown here, which is designed for a 6-in-12 roof slope.

Step A: Mark the Plumb Cuts



1. Select a straight board to use for the pattern rafter. Mark the top plumb cut near one end of the board: Position a framing square with the 6" mark of the tongue (short part) and the 12" mark of the blade (wide part) on the top edge of the board. Draw a pencil line along the outside edge of the tongue.

2. Starting from the top of the plumb-cut mark, measure along the top edge of the board and mark the overall length of the rafter, then use the square to transfer this mark to the bottom edge of the board. Position the square so the tongue points down, and align the 6" mark of the tongue and the 12" mark of the blade with the bottom board edge, while aligning the tongue with the overall length mark. Draw a line along the tongue. If the bottom end cut of the rafter is square (perpendicular to the edges) rather than parallel to the top end, mark a square cut at the overall length mark.

Step B: Mark the Bird's Mouth Cuts

1. Measure from the bottom of the lower plumb cut and mark the plumb cut of the bird's mouth. Position the square as you did for the lower plumb cut and draw a line across the board face at the new mark.

2. Measure along the bird's mouth plumb cut and mark the bird's mouth level cut. Use the square to draw the level cut—it must be perpendicular to the bird's mouth plumb cut.

Step C: Make the Cuts

1. Cut the rafter ends at the plumb-cut lines, using a circular saw or power miter saw.

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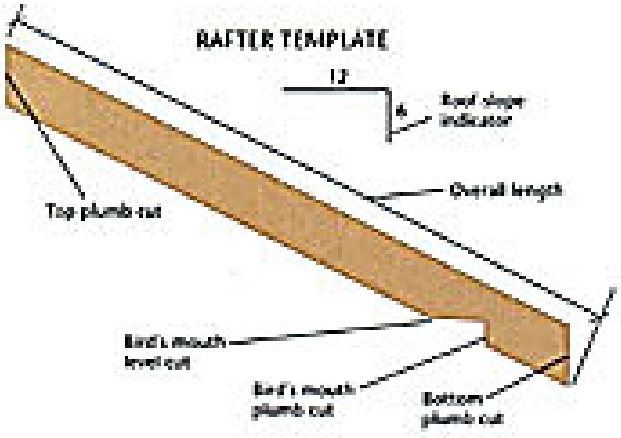

Step E: Lay Out the Wall Plates & Ridge Board

Note: Start the rafter layouts from the ends of the walls where you started the wall stud layouts. This ensures the rafters will fall above the studs. Install rafters aligned with the end studs but not the extra corner studs.

1. Make a mark on the top wall plate 1 1/2" in from the end. Then, mark at 15 1/4" (for 16" on-center spacing) or 23 1/4" (for 24" on-center spacing)—measuring from this mark, make a mark every 16" (or 24") to the end of the wall. Make a mark 1 1/2" in from the remaining end. Following your plan, draw an

2. Set the base of a circular saw to cut at the maximum depth. Make the bird's mouth cuts, overcutting slightly to complete the cut through the thickness of the board. As an alternative to overcutting (for aesthetic reasons), you can stop the circular saw at the line intersections, then finish the cuts with a handsaw.

3. Select another straight board to use as a second pattern rafter. Use the original pattern rafter to trace the cutting lines onto the duplicate, then make the cuts.

Step D: Test-fit the Rafters

1. Cut a 12"-long spacer block from 2 × 6 or 2 × 8 material.

2. With a helper or two, set the two rafters in place on top of the walls, holding the spacer block between the top rafter ends. Make sure the rafters are in line with each other (perpendicular to the walls) and are plumb.

3. Check the cuts for fit: the top-end plumb cuts should meet flush with the spacer block, and the bird's mouths should sit flush against the wall plates. Make sure the top ends are at the same elevation. Recut any angles that don't fit and test-fit the rafters again.

4. Write "PAT" on the pattern rafter, then use it to trace the cutting lines onto the remaining rafters. Before marking, check each rafter for crowning and mark the crowned edge; always install the crowned edge up. If your building has overhangs at the gable ends, mark the end cuts for the overhang rafters but not the bird's mouth cuts-overhang rafters don't have them. Also, if you have the fascia material on-hand, use the pattern rafter to mark the angle for the top ends of the fascia boards.

5. Cut the remaining rafters.

Step F: Install the Rafters

1. You'll need a couple of helpers and a long, straight 2 × 4 to get the rafters started. Lay the first two rafters on top of the wall, then nail the 2 × 4 to the far end of the ridge board to serve as a temporary support. Set up the rafters at the end of the walls and hold the free end of the ridge board in place between them. Have a helper tack the rafters to the wall plates. Hold a level on the ridge board and make sure it's level, then have a helper tack the support to the far wall to keep the ridge level.

2. Slide one rafter a few inches to the side and endnail the other rafter through the ridge board with three 16d common nails (use two nails for 2 × 4 rafters). Slide the other rafter

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× next to each mark, designating to which side of the line the rafter goes.

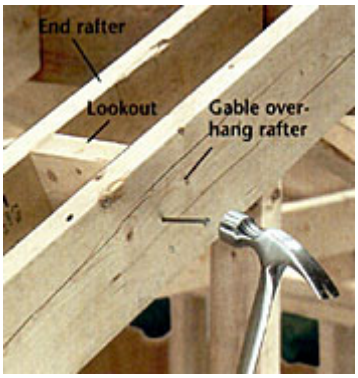
2. Mark the wall on the other side of the building, starting from the same end.

3. Cut the ridge board to length, using the plan dimensions. Check the board for crowning, then lay it on top of the walls next to one of the marked plates, making sure it overhangs the end walls equally at both ends. Use a square to transfer the rafter layout onto both faces of the ridge board.

Step G: Install the Collar Ties

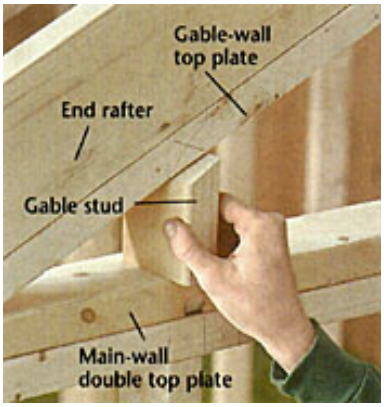
1. Cut the collar ties (or rafter ties) to span between opposing rafters at the prescribed elevation, angle-cutting the ends to match the roof slope.

2. Position the collar tie ends against the rafter faces so the ends are about 1/2" from the rafters edges. Make sure the ties are level, then facenail them to the rafters with three 10d common nails at each end.



onto its layout mark and toenail it to the ridge with four 16d nails (three for 2 × 4s). Toenail the lower end of each rafter to the wall plate with two 16d nails, then reinforce the joint with a metal anchor, using the nails specified by the manufacturer.

3. Make sure the rafters are plumb and the ridge is level. Install the remaining rafters, checking for plumb and level periodically as you work.



Step H: Frame the Gable Wall

Note: Gable walls consist of top plates that attach to the undersides of the end rafters, and short studs set on top of the wall plates. They appear only on gable and gambrel roofs.

1. Cut the top plates to extend from the side of the ridge board to the wall plates. Angle-cut the ends so they meet flush with the ridge and wall plate. The top-end angle matches the rafter plumb cut; the bottom angle matches the level cut of the bird's mouth.

2. Fasten the plates to the rafters so the front plate edges are flush with the outside faces of the rafters; use 16d nails.

3. Mark the gable stud layout onto the wall plate, then use a level to transfer the layout to the gable plates. Cut the gable studs to fit, angle-cutting the ends to match the roof slope. Install the gable studs with 8d toenails. Also install a square-cut stud directly under the ridge board.

Step I: Build the Gable Overhang (Gable Gambrel Roofs)

Note: Gable overhangs are built with additional rafters installed at the gable ends. They are supported by the ridge board and blocks called *lookouts*—attached to the end rafters.

1. Mark the layouts for the lookouts onto the end rafters, following the project plan. Cut the lookouts and toenail them to the rafters with 8d nails (or endnail them with 16d nails) so that the top edges of the blocks are flush with, and parallel to, the tops of the rafters.

2. Install the overhang rafters over the ends of the lookouts with 16d endnails.

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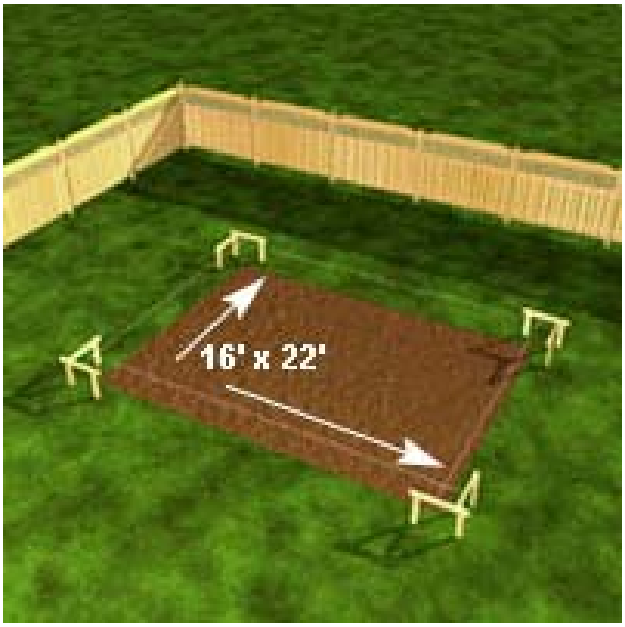
GARAGE

1. Build the foundation and floor

1.1 Carefully mark the location of the garage on your lot. Hire a surveyor to precisely locate the site for the garage and define the excavation area.



1.2 Have a contractor excavate the designated site to the required depth. He will properly dispose of the dirt excavated.

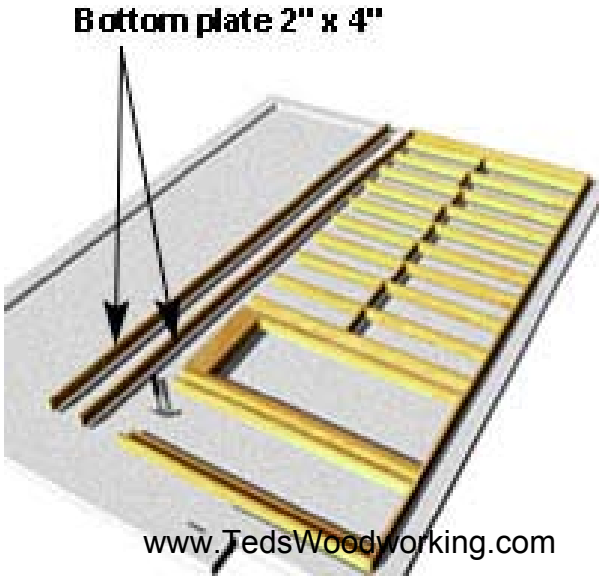
1.3 In order to build the foundation, we recommend you contract out this job. The foundation specialist will start with the footing, the concrete walls and backfilling before making the foundation slab. Make sure that anchor bolts are encased, centered every 4 feet (1.2 m).

2. Build the walls

2.1 Outside walls

Start the outside walls building them flat on the ground, using lumber with less than 19% moisture content. Wall studs should be centered every 16 in. (406 mm) and made of 2 x 4 in. (50 x 100 mm) timber. Strengthen the base of the walls with a 4 in. (100 mm) bottom plate in which you will drill holes every 4 ft. (1.2 m) for the anchor bolts.

2.1.1



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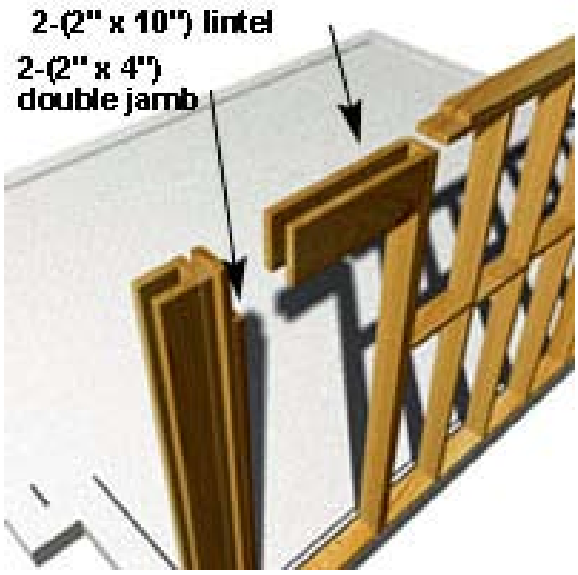
Separate the top and bottom plate slightly more than a stud's length apart with the bottom plate positioned nearest the wall's final location. Center the studs every 16 in. (406 mm). Attach pre-nailed double 2 x 4 in. (50 x 100 mm) top plates above the studs.

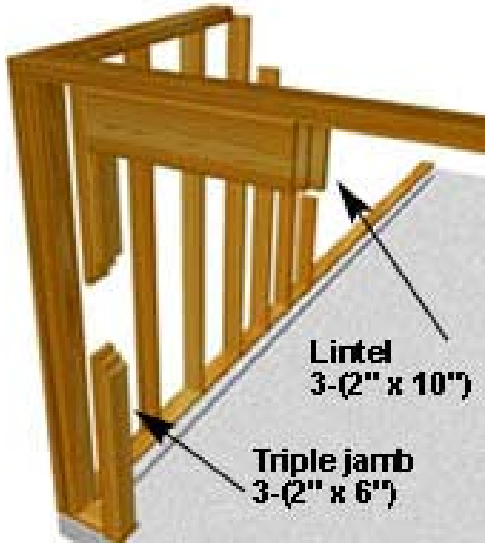
2.1.2 A secondary stud made of two planks solidly nailed together will delineate the sides of the door or window opening and support the coping.

2.1.3 The lintel (window contour) load will be transmitted to the twin studs on each side of the opening. To install a lintel, nail a 2 x 10 in. (50 x 254 mm) each wall face. Fill the empty space between them with insulation material.



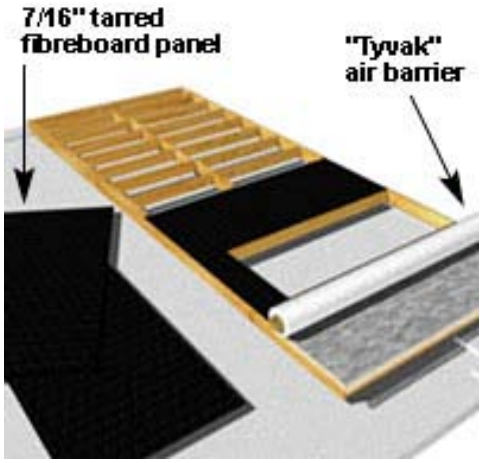
2.2 The garage door framing

Build the two short sections on either side of the large opening using three 2 x 6 in. (50 x 152 mm) studs nailed together. The top part of the frame (called lintel or header), is made up of three 2 x 10 in. (50 x 254 mm) nailed together then nailed to the trimmer studs of the two side sections.



2.3 Sheathing and air barrier

2.3.1 The suggested sheathing material is 4 x 8 ft (1.2 x 2.4 m) tarred fiberboard panels. Use a thin plastic air barrier.



2.3.2 First, apply the sheathing, positioning the panels on the wall (that is still flat on the ground) and nail to frame with dog nails. Apply the air barrier and nail or staple into place. Lastly, install fillers every 16 in. (406 mm).

2.4 Before lifting the wall into place, make sure the bottom plate is well positioned. At this stage, make sure you have enough people to lift and hold the wall in position while bracing. Nail braces from the top of the wall into stakes driven into the ground outside the wall and nail the wall upright to hold it temporarily.

3. Build the roof

3.1 With the walls up, you should close the roof as soon as possible to avoid rain or wind damage to the inside of your garage. Roof trusses are a pre-built series of structural members designed to carry the load of the roof to the outside walls. Trusses are built in special factories to the individual specifications for your garage plans.

3.2 Trusses are designed to resist loads only when they are in a vertical position. That is why they should not be lifted flat or laid over the top of the outside walls. Gently lift the trusses mechanically or with a rope and pulley.

3.3 Beginning at one end, measure and mark every 24 in. (610 mm) the location of the roof trusses on the top plate. Nail the trusses in place.

3.4 With the trusses installed, nail a temporary brace to each one. You can now start putting up the edge boards. Apply roof sheathing. Plywood or particleboard roof sheathing is most commonly used, being rigid, durable, non-slip and easy to apply.

3.5 Align panels perpendicular to the rafters and stagger the joints of each course. Panels should meet in the center of a truss or rafter. Leave a small gap between the panels for contraction of the material. According to the truss spacing, the horizontal edges of the panels should be attached every 24 in. (610 mm). To prevent sagging, use sheathing clips to attach the panels between the trusses.

4. Install doors and windows

Doors usually come with comprehensive installations, a pre-mung door is expensive and if not properly installed, will loose it,s energy efficiency and will not operate properly in the long run. It is recoomended to have your door indtalled by a professionnal. However, if you decide to do itself follow these instructions and get some help as they tend to be heavy.

5. Install the asphalt shingles

The next step is to install the asphalt shingles.

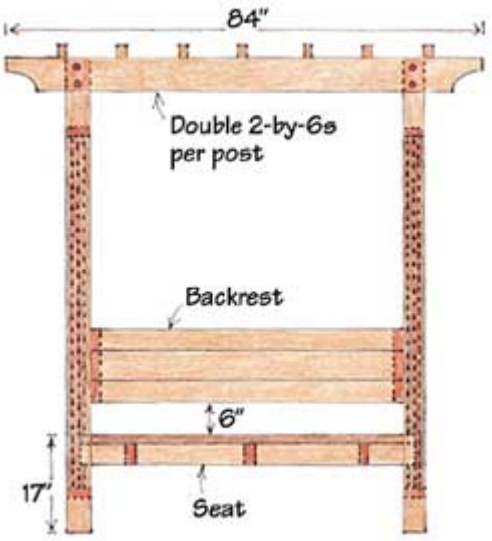
6. Install the outside siding

It is now the very last step, the one that has to do with the outside siding.

The construction of a garage is a huge project. Once it is completed you'll be proud of it. You will find it very useful and not only to put your car away in Winter.

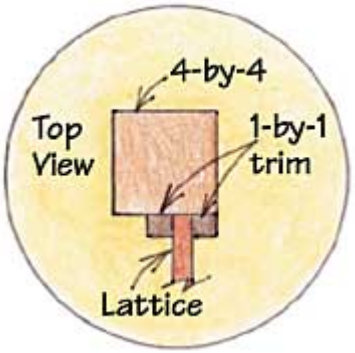
ARBOR BENCH

Materials



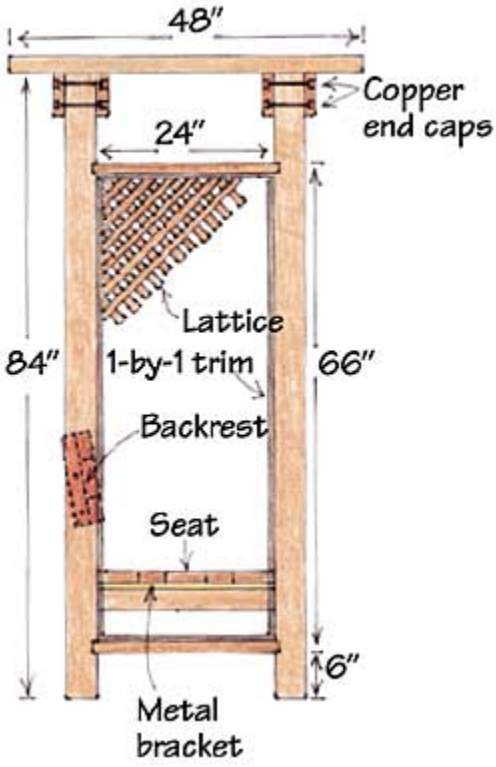
- Lumber
- 4-by-4s: four 8-foot lengths
- 2-by-4s: one 8-foot length, four 10-foot lengths
- 1-by-1s: eight 8-foot lengths (or rip down from two 8-foot lengths of 1-by-6)
- 2-by-6s: eight 8-foot lengths, two 10-foot lengths
- Two 2- by 8-foot redwood lattice panels
- 3 1/2-inch deck screws
- 2-inch galvanized finishing nails
- Six 2-by-4 joist hangers (with nails)
- 6 feet of undermount deck fastening brackets
- 30 1 1/4-inch deck screws (for seat)
- A dozen 2 1/2-inch screws
- Eight 5 1/2- by 3/8-inch carriage bolts
- Eight 3/8-inch washers
- 16 3/8-inch nuts
- Sandpaper
- Clear wood sealer
- Cotton rags
- 16 1-inch copper-pipe end caps

Tools



Most of the project requires basic woodworking tools--a circular saw, a saber saw, an electric drill, a hammer, and a nail set. You'll need to rip a few boards into smaller sizes; you can use a table saw or ask the lumberyard to do it. You'll also need:

- Tape measure
- Pencil
- Combination square
- Compass
- C-clamps or adjustable clamps
- Framing square
- 15/16-inch paddle bit
- Extra-long 1/2-inch drill bit
- Socket wrench set
- Ladder
- A small pump sprayer (about $10) to apply wood sealer (optional)
- Pipe clamps



Directions

The arbor bench has four main sections: the two sides, the bench seat, and the backrest. Build it in the sequence that follows, allowing for the inevitable variation in the thickness of the lumber and lattice, which will affect widths and lengths. The trellis top, which consists of two pairs of horizontal 2-by-6s and seven 2-by-3 crosspieces, is added piece by piece. Before starting construction, rip four of the 8-foot 2-by-6s in half (to create 2-by-3s).

Assembling the side sections

1. Cut the 4-by-4s 84 inches long. To avoid splintering, bevel the bottom edges of each post.

2. Divide the posts into pairs and mark them (A and B, C and D). Lay each pair side by side on a flat work surface. Measuring from the bottom end, mark points at 6, 7 1/2, 70 1/2, and 72 inches. Using a pencil and combination square, draw lines at these points across the width of the posts. Set blade of circular saw to extend 1/4 inch and make multiple passes to remove the wood between the pairs of lines, creating grooves.

3. Measure actual width of lattice panels, add 1/2 inch to that dimension, then cut four 2-by-4 crosspieces to that size.

4. Turn pairs of posts so grooves face each other, place crosspieces in grooves, check squareness, and secure with two angled 3 1/2-inch deck screws.

5. Cut both lattice panels to fit between crosspieces, approximately 63 inches long.

6. Each lattice panel will be sandwiched between 1-by-1s mounted to the posts and crosspieces. Create the outer layer by cutting 1-by-1s to fit between posts and nail them to crosspieces flush to their *outside* edges. Cut and nail 1-by-1s to fit vertically between crosspieces. Place outer side face down on work surface. Insert lattice panel, then hold in place with 1-by-1s at top and bottom.

7. To complete sandwich, mark a point 17 inches from the bottom of each post. Measure, cut, and nail lengths of 1-by-1 that extend from the top crosspiece down to this point on either side of the lattice. (After seat is in place, cut and nail 1-by-1 to fit between seat and bottom crosspiece.)

The bench seat

The seat pieces are attached to a 5-foot-long ladder-like frame, which is held in place by deck screws that run through the frame and into the four posts. To

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make a snug fit, measure the distance between the posts and build the bench frame to that depth.

1. Equally space three 2-by-4 crosspieces between two 5-foot-long 2-by-4s and secure with joist hangers and nails.

2. Add undermount deck fastening brackets to top of each crosspiece.

3. Cut one 10-foot-long 2-by-4 and two 10-foot 2-by-6s into 5-foot lengths. Place on a work surface, alternating three 2-by-6s (save the fourth 2-by-6 for the back) with the two 2-by-4s. Position frame on top so the outer 2-by-6s are flush with the edge of the frame, equally space middle boards, and attach with 1 1/4-inch deck screws.

4. Stand the side panels on their back edges and slip in the bench so its top butts against the 1-by-1s on the inside faces of the posts. Check for squareness and drive two 3 1/2-inch deck screws through bench frame into each post.

The back

Slightly shorter than the bench, the back fits snugly between the two back posts. The actual size is determined after the bench seat is in place. The back is held together by screws running through a 12-inch 2-by-2 (ripped from a scrap of 2-by-4) at each end of its three boards.

1. After checking for squareness of the assembled sides and bench sections, measure the distance between the two rear posts. Cut two 2-by-4s and one 2-by-6 to this size.

2. Space the boards 1/8 inch apart, with ends flush. Overlay and attach the 2-by-2s, flush to the ends, with 2 1/2-inch screws. (Predrilling holes will avoid splitting the wood.) Round outside corners.

3. Stand the bench upright and recheck for squareness. Slip the back in place so the bottom board is 6 inches above the seat and the 2-by-2 backer boards are centered on the posts. Tack loosely in place with one screw through each 2-by-2 backer. Angle the back so it feels comfortable to lean against, then add another screw through each side. Set the screws firmly.

Adding the trellis

The top of the bench has two pairs of 2-by-6 beams connecting the posts and attached with countersunk carriage bolts. Seven 2-by-3s are spaced across the top.

1. Cut four 7-foot-long 2-by-6s. Using the compass, draw identical curving cutouts at the ends of each beam. Make cutouts with saber saw.

2. Lay the arbor bench on its back. Clamp a pair of the beams to the front and back of the front posts so they're flush with the tops and extend equally on each side. Find center line of posts, transfer to top 2-by-6, and mark points 1 inch from top and bottom edges.

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3. Drilling the holes through the beams and posts is the trickiest part of the whole project. When doing this step, it's important to keep the drill perpendicular to the work surface. Use a square as a guide. Start drilling with the 15/16-inch paddle bit and make a 3/4-inch-deep hole at each of the four marked points. Switch to the long 1/2-inch bit and continue drilling through the top 2-by-6, the post, and almost through the bottom 2-by-6. Stop when bit begins to break through. Remove clamps and bottom 2-by-6. Switch back to a 15/16-inch bit and drill back into board (using break-through hole as a guide), making a 3/4-inch-deep hole.

4. Reposition and clamp boards, aligning them over the holes. Slip the carriage bolts through all the boards, add washers and double nuts, then tighten firmly with socket wrench.

5. Flip arbor bench on front face; repeat steps 2 through 4 for rear set of posts.

6. Cut seven 48-inch-long 2-by-3s.

7. While bench is still on its front, find center of beams and mark points, evenly spaced (approximately 9 inches apart), for the 2-by-3s.

8. Stand arbor upright. Place 2-by-3s at points marked so they extend equally to front and back. Secure with 3 1/2-inch deck screws.

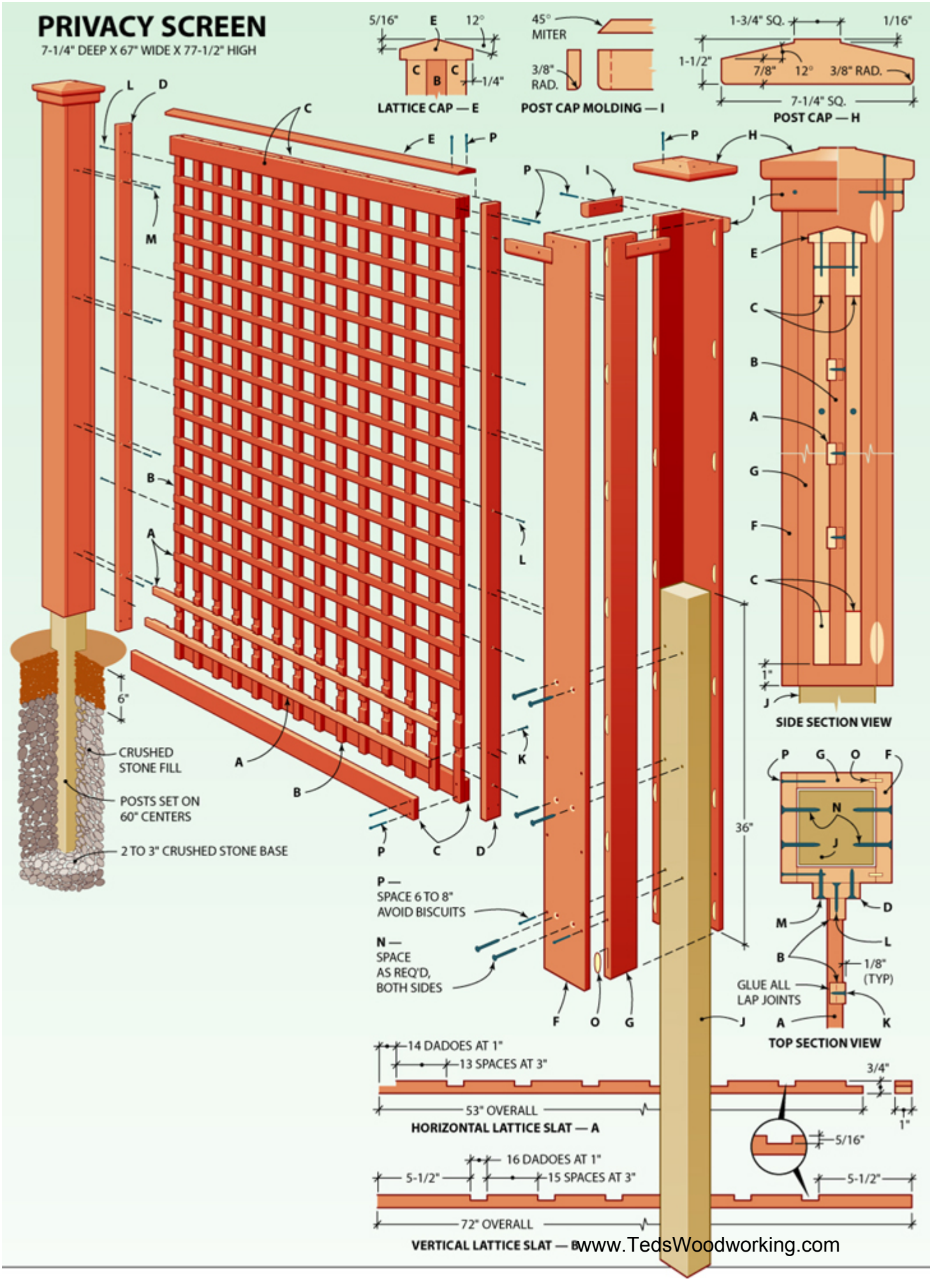
Finishing touches

Sand all the wood surfaces except lattice. Transport structure to outside location (two strong people can do this, but three are better). Using a small pump sprayer--a life-saver with all that lattice--apply clear sealer to all surfaces. Wipe off excess sealer with cotton rags. When dry, apply second coat, following directions. The last step is to insert the copper-pipe end caps in the holes for the countersunk bolts. Depending on the fit, you may have to hammer or glue them in position.

GARDEN SCREEN FENCE

PRIVACY SCREEN

7-1/4" DEEP X 67" WIDE X 77-1/2" HIGH



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Materials List--Privacy Screen		
Key	**No.**	**Size and description (use)**
A	16	3/4 x 1 x 53" cedar (horizontal slat)
B	14	3/4 x 1 x 72" cedar (vertical slat)
C	4	3/4 x 2-1/2 x 53" cedar (rail)
D	2	3/4 x 2-1/4 x 72" cedar (lattice end)
E	1	3/4 x 2-3/4 x 54-1/2" cedar (top cap)
F	4	3/4 x 5-1/4 x 76" cedar (post face)
G	4	3/4 x 3-3/4 x 76" cedar (post side)
H	2	1-1/2 x 7-1/4 x 7-1/4" cedar (post cap)
I	8	1/2 x 1-1/2 x 6-1/4" cedar (molding)
J	2	6'-long 4 x 4 pressure-treated post
K	224	3/4" No. 4 fh brass woodscrew
L	10	1-1/2" No. 8 fh brass woodscrew
M	16	1-1/2" No. 10 fh brass woodscrew
N	24	2" No. 10 fh brass woodscrew
O	56	No. 0 plate
P	as reqd.	6d galvanized finishing nail
Note: Quantities based on one lattice and two posts.		
Misc.: 120-grit sandpaper; Benjamin Moore Moorwhite Penetrating Alkyd Primer 100 and MoorGlo 100% Acrylic House & Trim Paint 096,		

Making The Lattice

First, crosscut 1 x 8 stock to length for the vertical and horizontal lattice members. Clamp each set of blanks in a stack with the ends flush, and mark the locations of the half-lap joints on the stock edges.

Use a dado blade to cut 5/16-in.-deep notches at the half-lap joint marks (Photo 1). Make two passes to complete each notch. Then, rip the lattice slats from the wide stock (Photo 2).

To assemble a lattice panel, first lay out the horizontal slats with a 3-in. space between each. Spread glue in the notches of a vertical slat and in the mating notches on the horizontal slats. Firmly seat the joints, and drive a 3/4-in. No. 4 brass screw at each intersection (Photo 3). Install the remaining vertical slats in the same way.

Rip and crosscut the top and bottom rails to size, and fasten them to each side of the lattice with 6d galvanized finishing nails (Photo 4). Cut the vertical end strips to size, and nail them to the ends of the top and bottom rails. Attach the end strips to the end vertical lattice slats with screws placed in between the horizontal slats (Photo 5).

Rip and crosscut blanks for the lattice panel cap. Then, tilt your table saw blade to 12° and cut the top bevels. Smooth the cut surfaces with 120-grit sandpaper and use galvanized finishing nails to fasten the cap to the top rails and end strips (Photo 6).

After cutting the 1 x 8 lattice stock to length, lay out the half-lap joint notches and cut them with a dado blade.

When the notches are cut, rip the 1-in.-wide horizontal and vertical lattice strips from the 1 x 8 blanks.

Apply glue to the half-lap joints and press the lattice strips together. Reinforce each joint with a single screw.

Position the top and bottom rails along each side of the lattice panel, and secure them with galvanized finishing nails.

Nail the vertical end strips to the top and bottom rails, and add screws between the horizontal lattice members.

After ripping the angles on the top of the lattice cap, fasten the cap to the rails and end strips with finishing nails.

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The Posts

Rip and crosscut the post faces and sides to finished size. While it's not necessary to use fasteners other than nails, post assembly is easier if you use joining plates to help position the parts.

Clamp a fence to the worktable and cut plate-joint slots in the post faces (Photo 7). Then, cut the corresponding slots in the edges of the post sides. Install the joining plates in the faces. Since the plates are only positioning aids, it's not necessary to use glue. Position the side pieces over one face, add the opposite face and secure with 6d galvanized finishing nails. Take care not to nail through the joining plates (Photo 8).

Cut 2 x 8 stock into 7-1/4-in. squares for the post caps, and set up the table saw to make the angled cuts on the caps. Begin by clamping a tall guide to the table saw fence. Tilt the saw blade to 12° and raise it so the top of the blade is 2-3/4 in. above the table. Adjust the fence so it's 7/8 in. from the blade at the table. Clamp one edge of a cap block to a 2 x 6 x 12-in. backer board. Turn on the saw and cut one of the angled faces (Photo 9). When the blade enters the backer board, shut off the saw, wait till the blade stops and remove the assembly. Then make the remaining cuts in the same way. If using the raised fence, backer board and clamps seems too complicated, simply shape the cap bevels with a hand plane. This may take longer, but it's a more relaxed procedure.

Mount a 3/8-in.-radius, quarter-round bit in your router table and shape the bottom edges of the post caps. Sand the caps and nail them to the post tops (Photo 10). Then, use the same bit to round one edge of 1/2 x 1-1/2-in. stock for the cap molding. Cut the molding pieces to length with a miter saw, and nail the mitered pieces under the post caps (Photo 11).

Lay out plate joints in the post parts and cut the slots. The plates keep the pieces aligned during assembly.

Assemble the box posts with plates but no glue. Then, use galvanized finishing nails to fasten the pieces together.

Use a tall auxiliary fence when cutting the post cap angles. Clamp stock to a backer board to support the cut.

Position the cap so it overhangs the post uniformly. Then, fasten it to the top of the post with galvanized finish nails.

Miter the ends of the cap molding pieces. Fit each piece under a cap and secure with galvanized finishing nails.

Assembly And Finishing

Bore screwholes in the lattice panel side strips, position a panel on one of the posts and secure with screws (Photo 12). Repeat the procedure for each lattice/post joint. If you're constructing more than one screen section, disassemble the parts into separate lattice/post subassemblies so they're easier to carry.

Cut pressure-treated 4 x 4s to 6-ft. lengths. Slide one of these pieces into the bottom end of each post so that 30 to 36 in. protrudes. Notice that the post cavity is 1/4 in. wider than the 4 x 4 to make installation easier. Drive two screws through the post into the 4 x 4 to temporarily hold it in place. After you install the screen you can remove the screws to adjust the relative heights of the posts.

Set all nail holes, then prime the screen with a quality exterior-grade primer. We used Benjamin Moore Moorwhite Penetrating Alkyd Primer 100. Fill all nail holes with glazing compound or painter's putty, then apply a coat of a 100 percent acrylic topcoat, such as Benjamin Moore MoorGlo

Bore screwholes in the lattice side strips and position the lattice on a post. Attach with screws.

100% Acrylic House & Trim Paint 096.

To install the screen, mark the post centers on the ground, and use a posthole digger or shovel to dig holes at least 30 in. deep. Place a few inches of crushed stone in the bottom of each hole.

Bring the screen to the site and reassemble it. Tip the 4 x 4 post ends into the holes, and brace the screen so that the posts are plumb. Fill the holes with more crushed stone to within 6 in. of the surface, tamping it down to provide a solid base. Then top off the holes with topsoil. Check that the bottom rail of the screen is level. If necessary, remove the screws that hold the posts to the 4 x 4s and adjust the height of the screen as required. Install more screws to hold the posts to the 4 x 4s, then fill the holes over the screwheads and touch up the paint. This system will work for locations where the ground slopes no more than 2 in. from one end of the screen to the other. For dramatically sloped yards, you'll need to construct posts that accommodate the difference in grade.

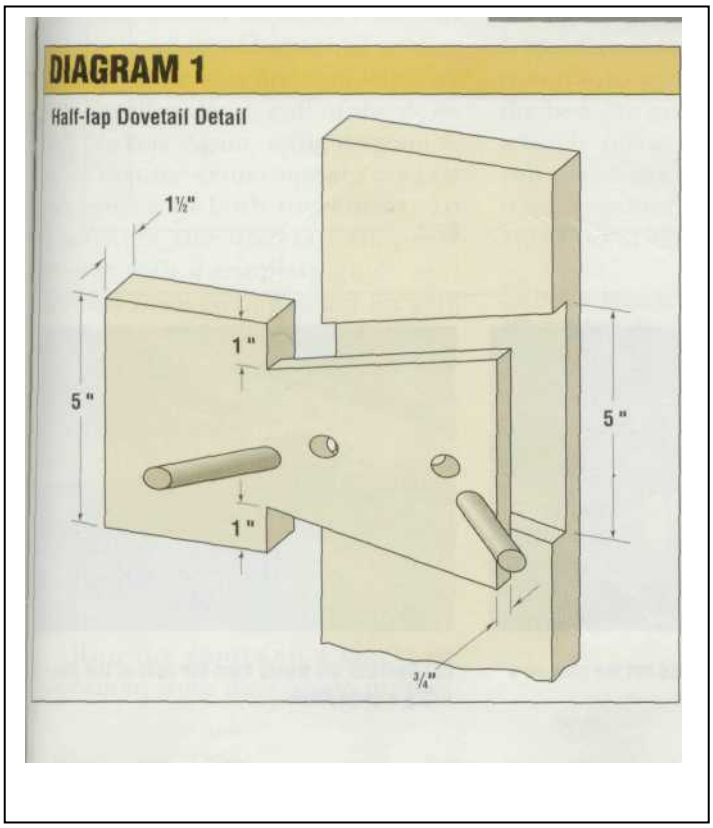
CHILDREN'S BUNKHOUSE LOFT

Children's bedrooms are frequently the smallest rooms in the house. And, as the youngsters grow, their space seems to become smaller. One way to lessen this problem is to go vertical, as in building a loft.

The loft we've constructed was made from 12 simple 2x6s in 8' lengths. We used standard yellow pine, but did spend a few minutes at the lumberyard trying to pick out the best looking wood without large knots, twists or terribly mangled edges.

Even having been picky with our lumber, we still felt more comfortable ripping and planing the boards to 1 ½" x 5" to remove the factory edges and to make sure the material was uniform.

Once your boards are ready, pick the straightest ones and cut the five long rails to length. Work through the cutting list from longest to shortest, getting your shortest lengths from the worst lumber.



Loft Frame Cutting list

	No.	Size
Posts	5	1½" x 5" x 60"
Face frame rails	4	1½" x 5" x 82¼"
Face frame rail	1	1½" x 5" x 61½"
End rails	4	1½" x 5" x 41"
Step rails	4	1½" x 5" x 26"
Mattress support	1	¾" x 40¾" x 75¾"

Bookcase Cutting list

	No.	Size
Shelves	6	¾" x 8" x 39½"
Ends	4	¾" x 8" x 30"
Backs	4	¾" x 6" x 39½"
Shelf supports	12	¾" x 1½" x 39½"
Cleats	12	¾" x 1½" x 4½"

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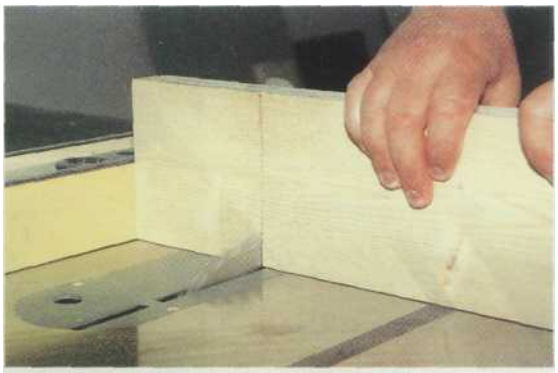
You're now ready to cut the half-lap dovetails which will provide aesthetics, as well as stability and strength, to the loft (diagram 1). Start by separating the lumber into vertical (posts) and horizontal (rails) piles. All of the horizontal pieces (the five longer rails and the steps) will receive the pins for the dovetails.

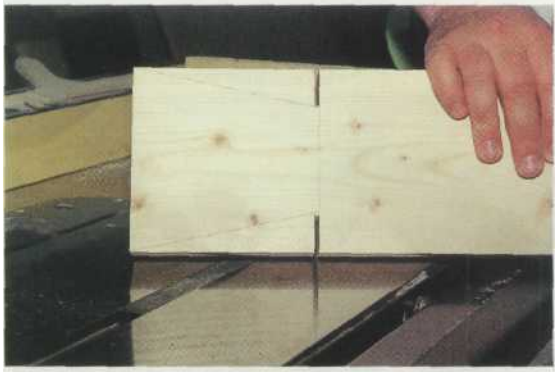
The first cut, to form the shoulder of the pin, was accomplished on the table saw using the rip fence as a guide set at 4 7/8" (5" with the kerf) (photo 1). We chose to work with a 12° angle for the dovetails, and marked the board to use the entire width. Photo 2 shows the defined shoulder and the pin as marked.

Without changing the rip fence setting, lower the blade height to 3/4", Then run the back side of each pin to form the cheek of the joint (photo 3). Take note, we had all the dovetails' joints visible to the front of the bed, including those on the rear frame.

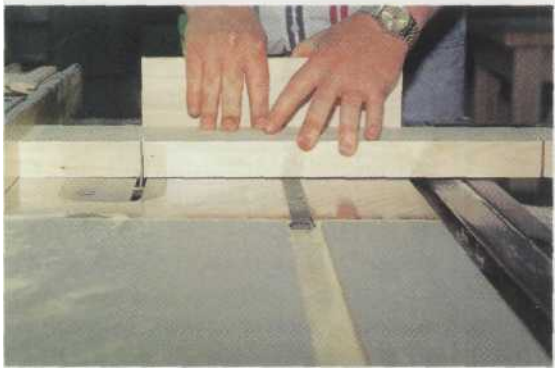
To form the pin itself, move to the



1 The shoulder of the pin is cut on the table saw, 5" in and 1"



2 Flip the board and make the same cut on the opposite side. Note the angle for the dovetail.



3 Lower the blade to 3/4″ and run the backside of the pins to form the joint's cheek.

band saw and follow your 12° marks, cutting from the front side (photo 4). We freehanded the cuts since the overall finish of the piece is intended to be rustic. If you choose, a sled jig can be made to cut the tails in a more exact manner.

The final step in forming the pin is to remove the waste from the rear to form the half-lap. After considering a number of methods of performing this step (hand sawn, resawn on the band saw, using a router), we opted to use a dado stack on the table saw **(photo** 5). This method removed the waste quickly, and in a safe and uniform manner. If the dado stack isn't an option for you, the router may be your next best choice.

To form the dovetail pockets, we marked the location of all the pock-

DIAGRAMS 2 & 3

Diagram 2 Front Frame Layout

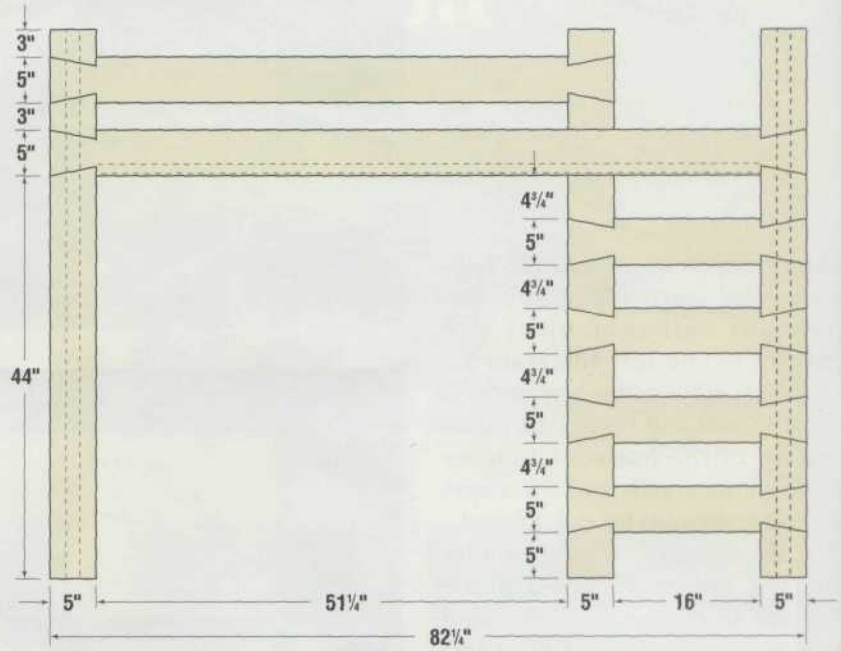
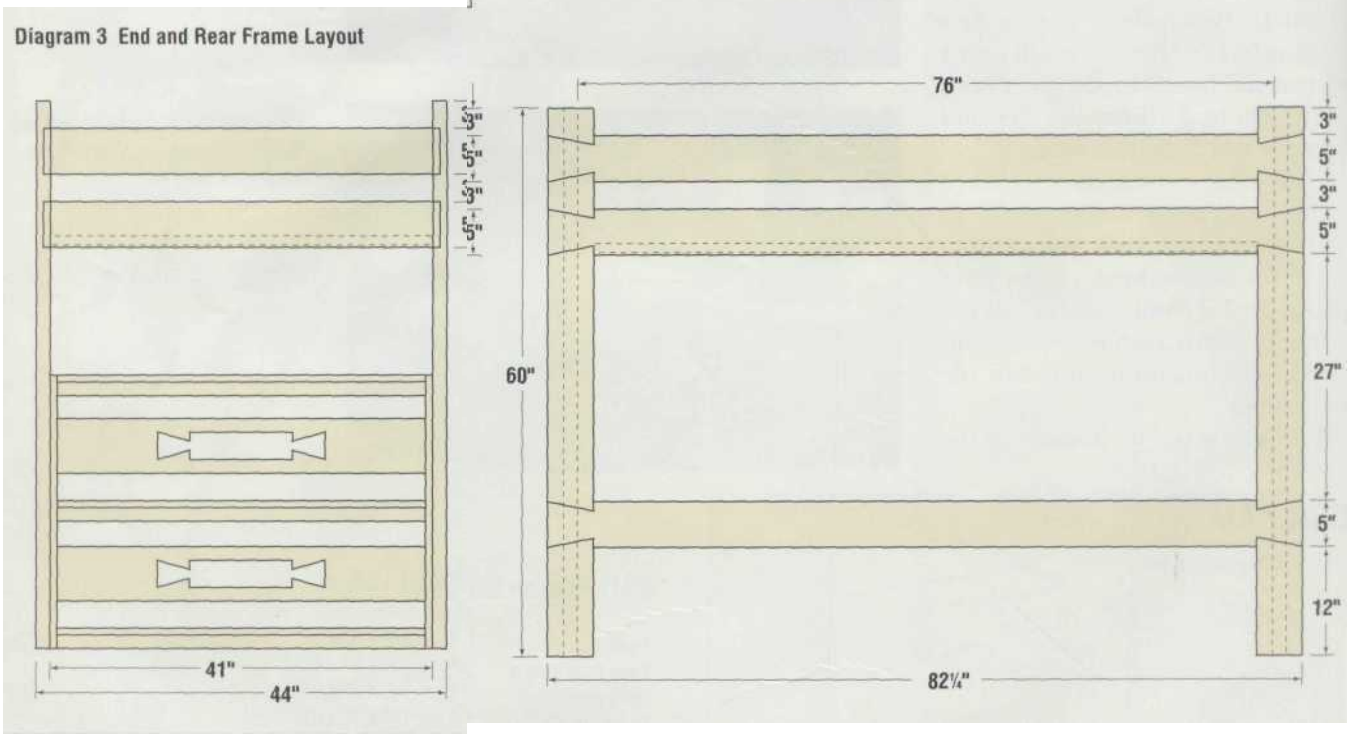
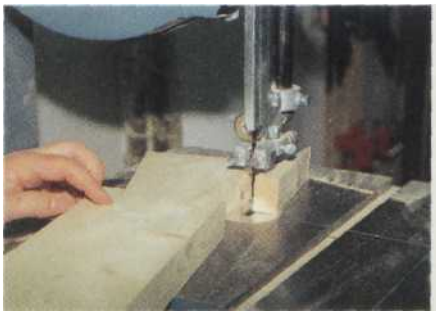


Diagram 3 End and Rear Frame Layout



4 Follow the 12° marks and cut the pins on a band saw.



5 Remove the waste from the rear of the pin using a dado stack.

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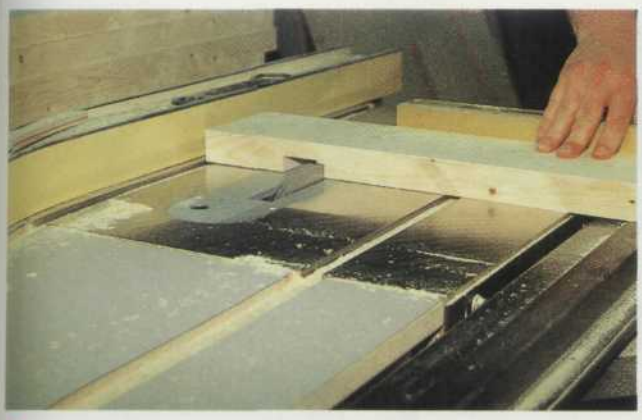
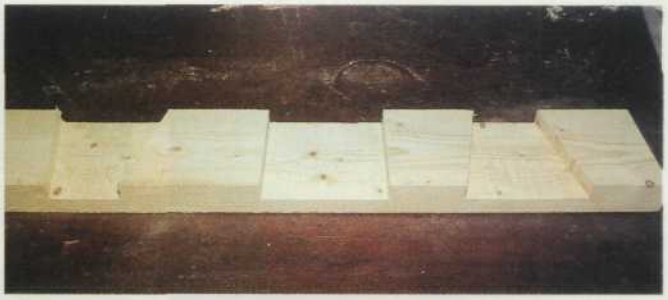
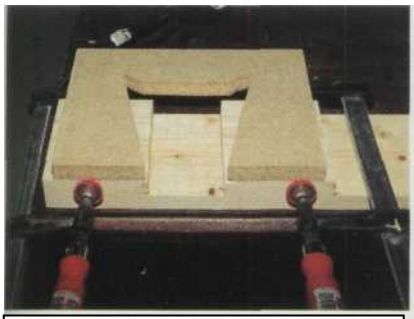


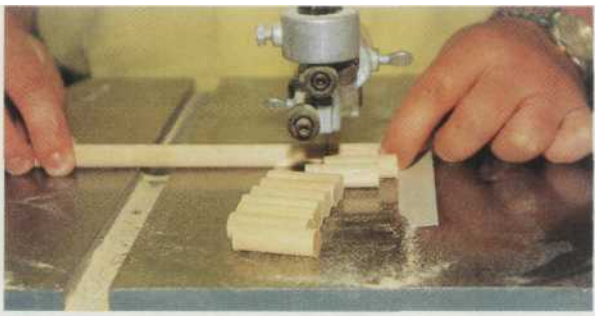
6 Remove the waste from the dovetail pockets using the dado set-up.



7 Detail showing dovetail pockets and the full 5" half-lap.



8 A template guide makes quick work of finishing the dovetail shape



9 1½" dowels, cut on the band saw, help make the joint stronger.

ets **(diagrams** 2 & 3), left the dado stack in the saw and removed most of the material from the posts (photo 6).

As you're cutting the dadoes, note that the center post requires a full 5" half-lap joint **(photo 7).** The mate to this joint should be located and cut on the lower front horizontal rail.

After these cuts are complete, lay out the direction for all of the dovetail pockets. Again, using **diagram** 2, note that the center upright pockets are going in both directions. To complete the dovetail shape, a router with a template guide and upward spiral cutting router bit were used. The template can be made out of most any common scraps in your shop **(photo 8)**.

Clamp the template firmly in place. If you're using a 1/2″ shank bit, the router depth can be set to match the full dado depth and cut in one pass. If you're using a 1/4" shank, you'll want to use two depth passes to remove the waste material.

Run the router in a clockwise direction, from the outside in, starting at the bottom left. Be careful not to run the router in the opposite direction, as it may cause kickback.

Once all the pockets are cut, check the fit at each joint. Chances are good some minor adjustments with a chisel will be required.

In gluing-up the front and back frames you may want to consider how transportable you want to make the bed. We glued each frame up as a single piece, but for convenience you may want to screw parts of the frame together to make it more of a knock-down design.

To make the joint even stronger (and the whole piece more aesthetic), we used 1/2″ dowels to pin the dovetail joints. Cut the dowels to uniform length *(1 1/2")* using the band saw. To make the cut safely we used a piece of tape to mark the length **(photo 9).** Don't work too fast and keep your fingers clear.

Start your glue-up with either the right or left end of the back frame. Use a flat work surface which you can clamp the glued components to. Cover all touching surfaces of the joint with glue and clamp the two pieces together.

Next mark a 1/2″ drill bit at 1 1/4" with a piece of tape. Then, with the drill held at an approximate 45° angle, drill two holes through the dovetail joint, stopping at the tape **(photo 10).** The two holes should be drilled at opposing angles. The

10 Drill ½" holes at a 45°, 1¼" deep, to accept the dowels.

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dowels

11 The dowels in place and the joint clamped.

12 After the glue has dried, cut the dowels with a hand saw.

13 The knock-down hardware installed.

14 The aluminum "L" track is mounted 1" up from the bottom edge of the rail.

15 Veneer tape is simply ironed on to the visible edges of the MDF board.

should be glued and hammered into place **(photo 11).** We used a smaller dowel to spread the glue around the interior of each hole to get even coverage. Repeat this process for the other two joints on that end and let dry.

After the glue has set, repeat the process on the opposite end. Then move to the stair section, and finally the left end of the front frame.

After both frames have dried, any dowels extending beyond the frame can be cut flush with a hand saw **(photo 12).**

Unless you've been extraordinarily precise or lucky, your joints will more than likely not fit flush in all places. If you try to sand or plane these joints flush, you'll end up doing more harm to the appearance than good. So, in keeping with the overall rustic look, we opted to leave any rough joints as they were.

To make the loft more "child friendly," we used a 1/4" roundover bit in a router on all the edges of both frames and the long edges of the four end rails.

The next step is to install the knock-down hardware to assemble the bed. Many types of knock-down hardware are on the market, so the type you choose may be quite different from ours. With our hardware it was necessary to rout pockets in both the face of the frames and ends of the cross pieces that mount the KD plates flush to the surface **(photo 13).**

Assemble the bed to check the fit of all pieces. This also is a good opportunity to measure and attach support rails for the 3/4″ plywood which will, in turn, support the mattress. For our loft we chose a 1/8″ gauge aluminum "L" track drilled, countersunk and mounted 1" up from the bottom edge of the lower rail **(photo 14).**

This is not, however, the least expensive method to support the plywood and mattress. Other fine alternatives include 1" x 1 " wood strips attached in the same location, or "L" brackets rather than "L" strips. Regardless of your choice of material, make sure it will support plenty of weight without allowing the plywood to slip out of place.

At this point the loft is essentially complete; but to provide toy and book storage and to strengthen the overall piece, we added a couple of simple bookcases **(diagram 4).**

The cases were made from 3/4" MDF (medium density fiberboard) material with a factory Birch veneer on both sides. To finish the look of the pieces we used Birch veneer tape on the visible MDF edges. The veneer tape is simply ironed on **(photo 15).**

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16 Once the veneer has been attached, it can be trimmed using a block plane.

then trimmed to fit using a block plane **(photo 16)** and sanded flush.

Part of the Southwestern detail is achieved by using a jigsaw to cut out part of the backs **(diagram 4** & **photo 17).**

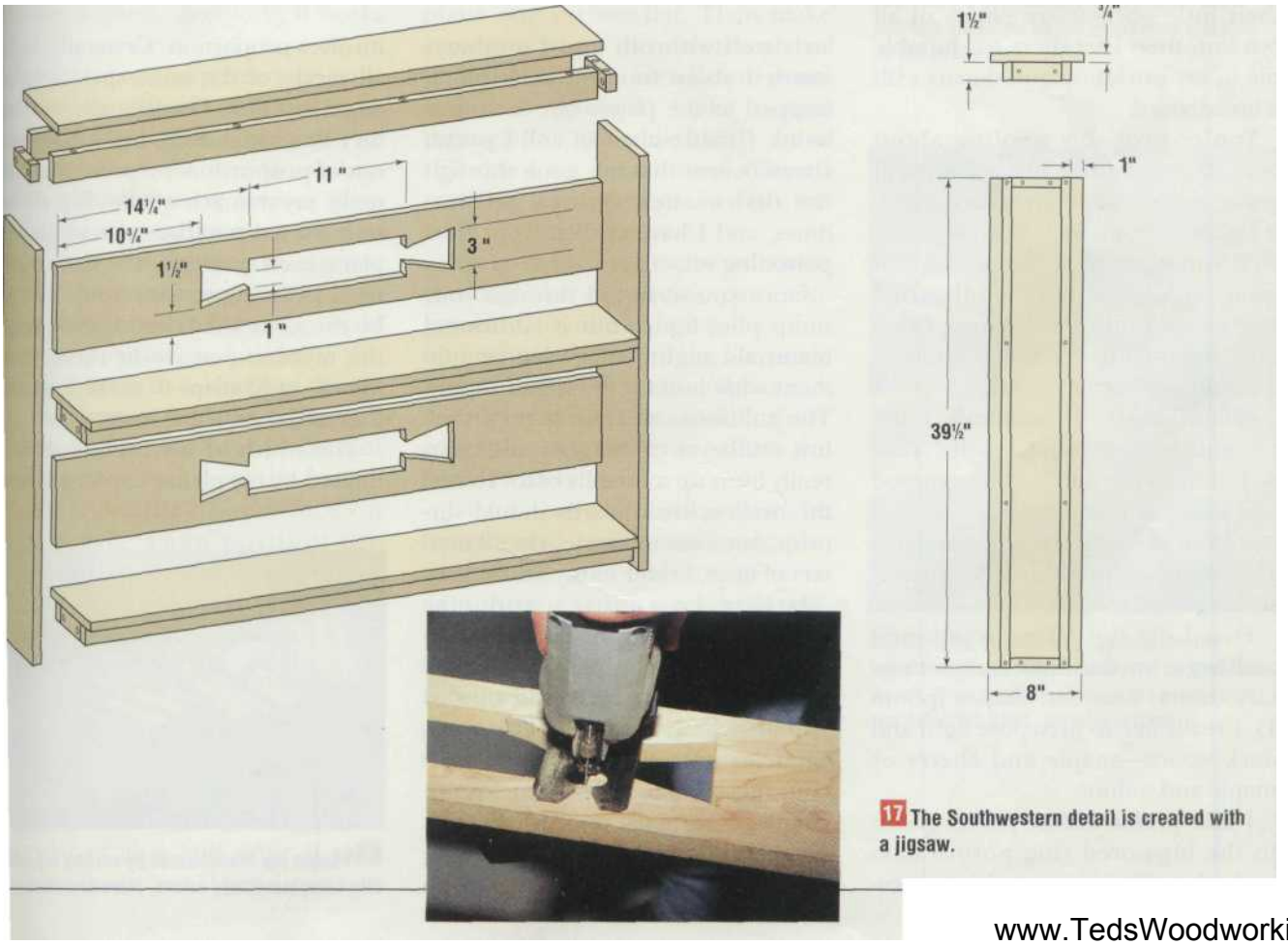
The next step is to attach the pre-drilled shelf supports and cleats to each shelf s underside **(diagram 5).**

After that, it's a simple process of screwing the cases together. The backs were pilot drilled and screwed into place through the case ends. When in place between the posts of the bed, these screws won't be visible. The cases themselves are then screwed between the posts from the inside.

As shown in the opening photograph, we used an oil-based grey wash stain which was a simple wipe-on, wipe-off process. This brought out more of the wood's character and gave the piece a more antiqued "barn board" look. We used multiple coats of lacquer with a dull finish to seal and protect.

You've no doubt by this time realized that these same plans can be rearranged to fit your particular space needs. In fact, you can even duplicate the frame's upper structure and make a traditional bunk bed. However you design it, we hope your special youngsters enjoy their time "aloft."

DIAGRAMS 4 & 5



17 The Southwestern detail is created with a jigsaw.

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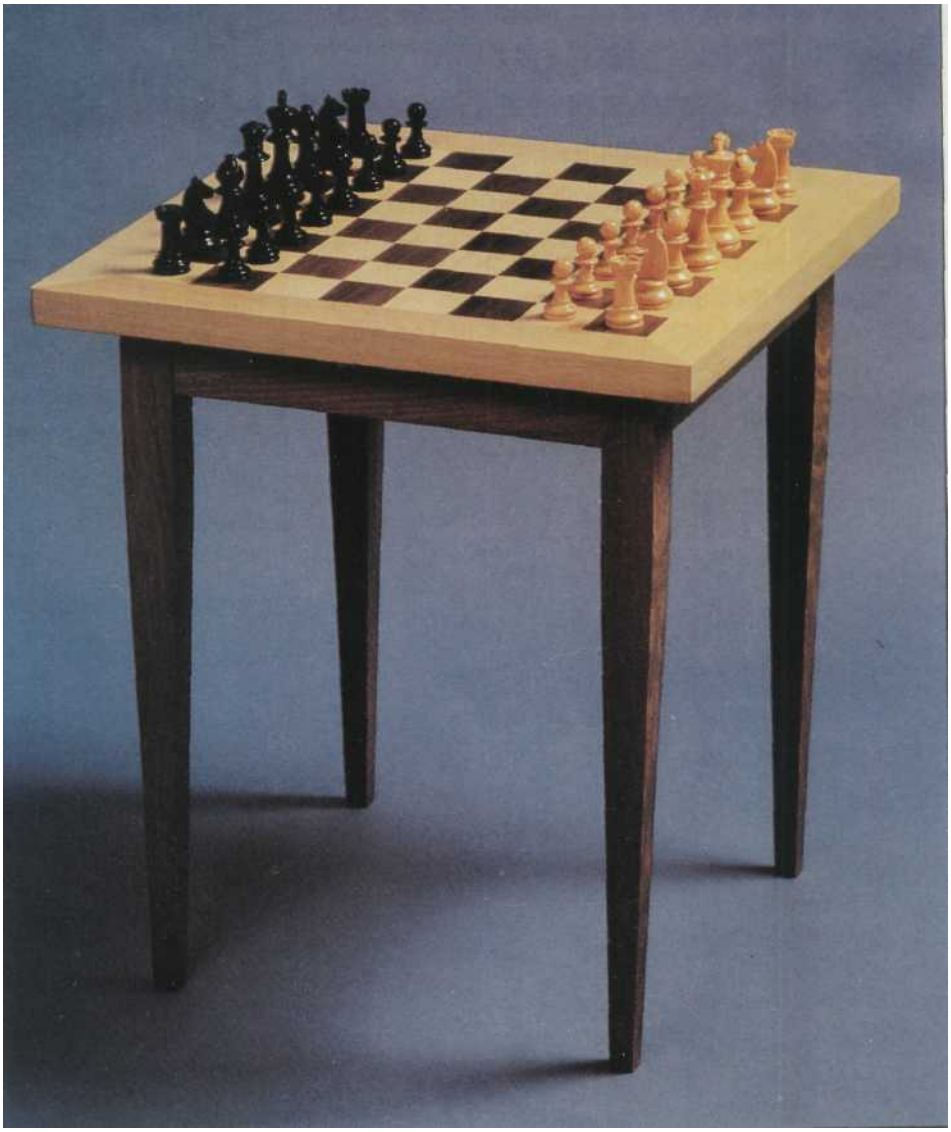
TRI-COLOUR CHESS TABLE



Have you ever played a serious game of chess while crouching on the floor? You're likely to be racked by lower-back pain. And unless you're a chess fanatic, storing the board out on a surface can take up room needed for other purposes.

This chess table evolved to cure these problems and put the enjoyment back in the game. But even if you don't play, you'll have to admit the top's checked pattern and full four-quarter thickness is an eye-catcher.

This tri-color chess table gets its name from the black walnut, white oak, and blond, fine-textured hardwood, known as *ramin*, it's constructed from. But it doesn't really matter what you make it out of as long as one species color-contrasts from the other (for obvious reasons). Even using just one variety of a light colored, tight-grained softwood and staining the alternate strips of the board could save you the trouble of searching for a darker species. The legs and frame can be matched with the border.

There's no trick to setting up the board other than keeping your cuts square, your blade sharp, and your work on a flat surface. Alternate strips of dark and light wood are glued together, face side down directly on the pipe clamps. It's best to apply the glue sparingly and carefully, so no excess runs from the joints to spoil the final finish. You also should be aware that rust or oil on the clamps can put an indelible stain on the wood, so cover the pipes with kraft paper to prevent disappointment.

Once the parallel strips are cross-cut, they're shifted alter-

Dimensions

Materials List

1	1×6×5′	ramin
2	1×2×3′	walnut
1	1×3×4′	white oak
1	2×3×40″	white oak

(All measurements are in actual dimension)

Cut List

5	1×1¾×18	ramin strips
4	1×1¾×18	walnut strips
4	1×1¾×17½	ramin border
4	1×2×11½	white oak skirts
4	1½×1½×19	white oak legs
4	1×1¾×2½	ramin corner braces

Hardware and Materials

4 #6×1¾″ cabinet screws
Yellow carpenter's glue (aliphatic resin)

Cutting Assignments

1×6×5′	ramin strips border corner braces
1×2×3′	walnut strips
1×3×4′	skirts
2×3×40″	legs

Tools

Table saw
Radial arm saw (optional)
Taper jig
Combination square
Framing square
Measuring tape
VSR drill (variable speed reversible)
#6 screw bit
#2 Phillips bit
4 pipe clamps
Bar clamp
Band clamp
Palm sander
Belt sander (optional)

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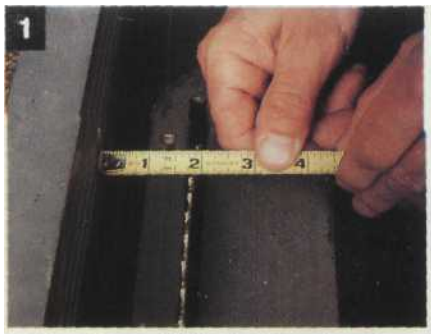
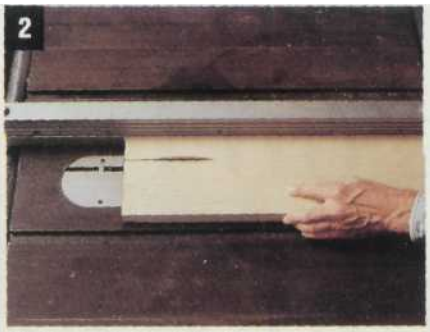
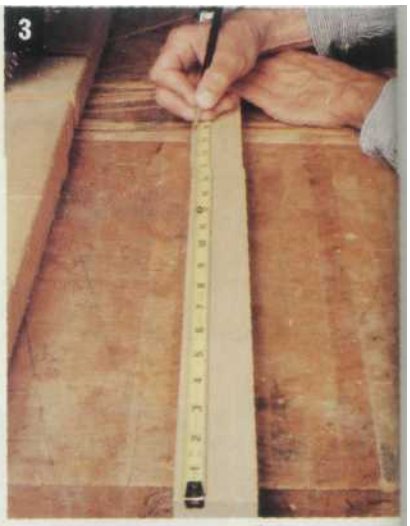


Set the table saw blade at a 90° angle and measure exactly 1¾" from the fence.



Rip the ramin into 1¾" strips.



Cut nine 18" lengths from the 1¾" ramin strips and select five.

Glue the strips together with an even bead, alternating the four dark and five light species to make a 15¾" width. Place the best face down toward the clamps.

Use the edge of a framing square to check the plane of this initial glue-up. Any inconsistencies should show on the exposed side, which will be the underside of the table surface. Square one edge as well before tightening the clamps.

After 24 hours, once the glue is dry, square up the board against the miter gauge and carefully trim the squared edge.

Mark the miter lines on one end of each of the four remaining 1" × 1¾" × 18" border strips.

Establish the exact length of the first piece against one edge of the board and mark the opposite miter. Set the miter gauge to a 45° angle, and cut the first border piece. Cut the marked ends of the other three pieces.

Determine the exact length of each remaining border by measuring against its respective s before you mark it. The finished lengths shou be very close to 17½".

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Rip the walnut into 1¾" strips and cut them into four 18" lengths.

nately and reglued with the same care to create the checked pattern (**step 9**). Then the border pieces can be trimmed and fastened. Though you may prefer to rip down the 1¾" border to a less imposing 1" width, I left it full to provide for a place to line up chess pieces taken in play.

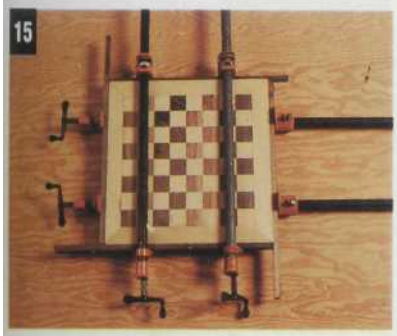
This project does not use metal fasteners, except for four screws that hold the corner braces to the legs. All the joints rely on an even application of glue and solid clamping. However, don't make the mistake of overtightening the pipe clamps, which would force the glue out of the joints and weaken them.

You can finish the table with a brushed-on semi-gloss polyurethane for good abrasion and stain resistance. If durability isn't a major concern, try a wipe-on technique using water-based polyurethane for a thinner coat. Simply slosh the liquid over the surface and remove it immediately with a lint-free rag. It will get into the wood and still leave a somewhat protective film that looks surprisingly like a Danish oil finish.

Reset the fence for a 1¾" cut and pass the board through the blade until you've got eight dark-and-light strips. Arrange them in the same order they've been cut.

Using the same procedure as before, glue the eight strips together, in order, best face down, but shift every other strip by one block width to create the checkered pattern. Line up the cured joints carefully, because you won't get a second chance!

Clamp the board and allow the glue joints to cure for another 24 hours. Note the protective stickers at the clamps' heads and tails.



Glue and clamp the finished border pieces to the board. The border and board should be on an even plane against the pipe clamps.

Use the saw's miter gauge to carefully trim the board to a 14" square.

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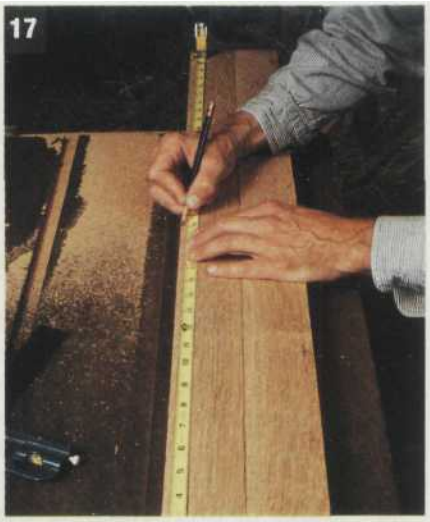
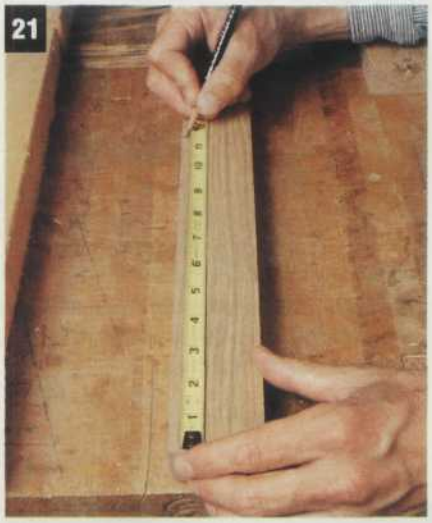
Rip the 2" × 3" × 40" leg billet in half to make two 1½" × 2" × 40" pieces.

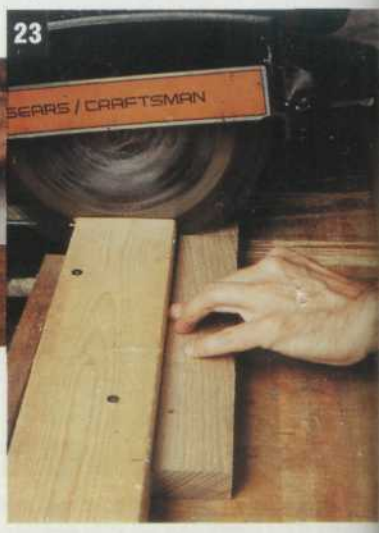


Lay the pieces side by side, align the ends flush, and mark at 19".

Use a square to carry the mark to the adjacen piece, then cut both. Repeat the procedure on remaining pieces to make four 19" leg blanks.



Measure an 11½" length on the 1" × 2" × 48" skirt piece. Square the mark and cut. Repeat for the remaining three skirt pieces. Now's the time to check the skirts and legs for blade burn, and sand the faces if needed.



Tilt the table saw blade to a 45° angle and cut the four 1" × 1¾" × 2½" corner braces. Because the work is so close to the blade, clamp each brace to a scrap of 1 × 2 and make the cuts that way. Be sure the clamp clears the blade before starting the saw.

Set up the table frame on a flat work surface with a band clamp placed snugly around the frame's circumference. Use a #6 screw bit with the stop collar set at 1¾" to pre-drill a hole through each brace and then into the leg behind it. Center the hole ¾" from the exposed edge, and set the braces flush against the work table.

Glue the skirts to the legs, and the braces to skirts. If the corner braces don't set squarely against the skirts, place and draw up the cab screws lightly to hold the braces in place. Tigh the band clamp.

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SERVING TRAY

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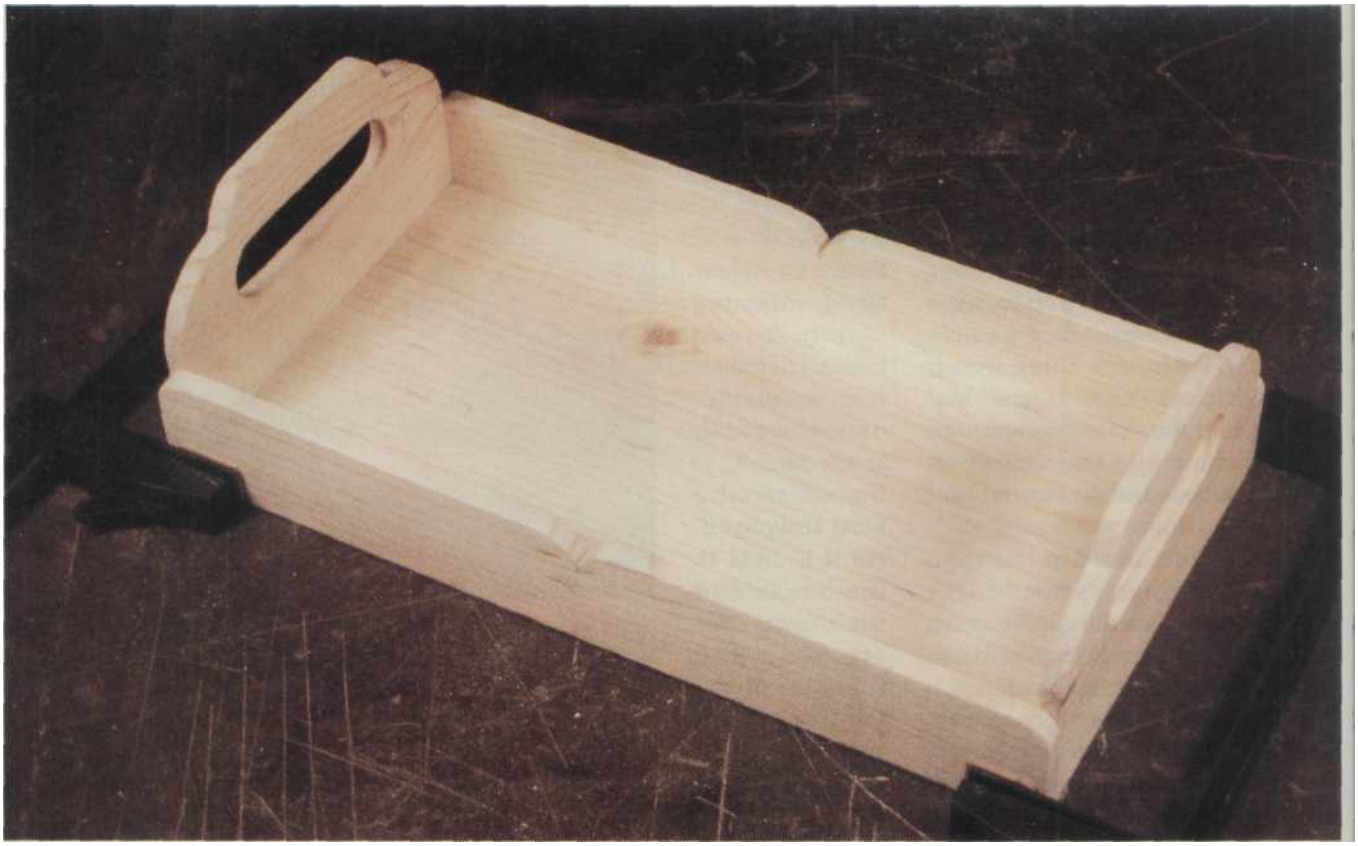


This is a great project for using up some of that leftover, common pine you've got lying around the shop. It won't take much material or time to build this tray once you get the stock to its proper thickness.

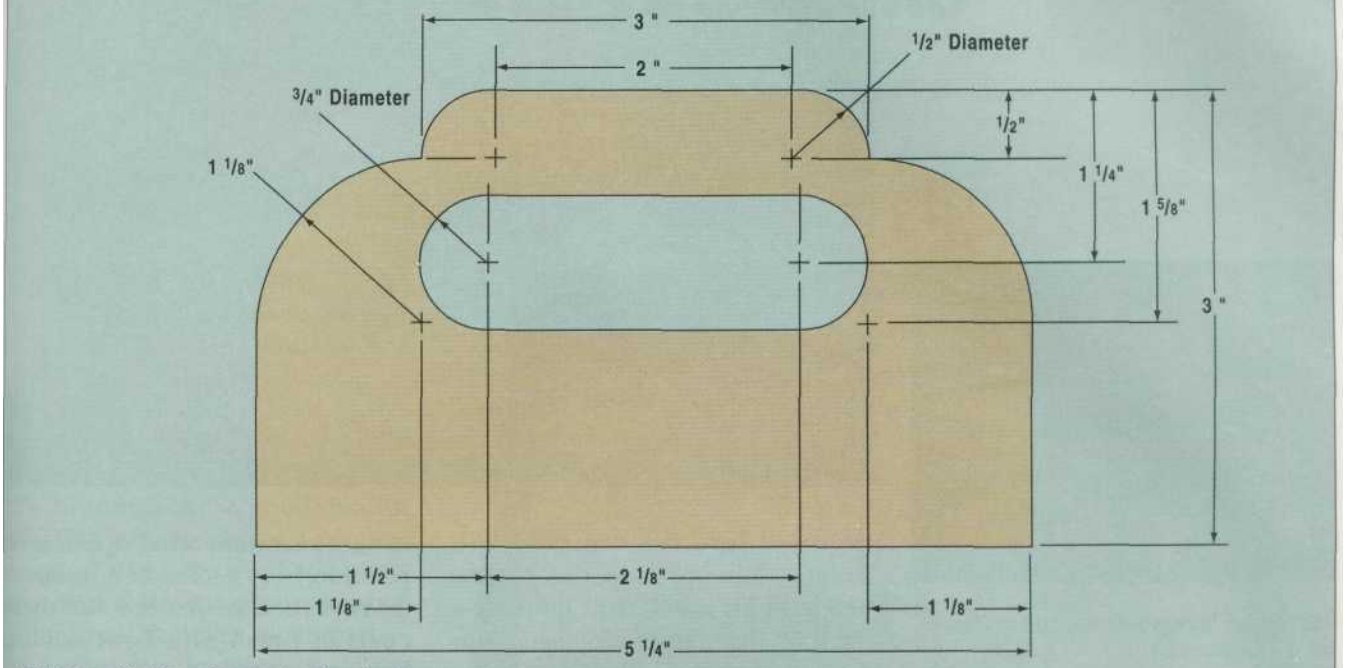
You also should enjoy both the easy construction methods and the results. Another interesting feature is the use of round pegs that give the piece an antique look. Once you see how it's done, you'll want to use this method on other projects to add both strength and beauty.

Start with 3/4"-thick common pine stock and resaw it so it can be finished to a 1/4″ thickness. Resawing the lumber is easily done on a band saw, but this material is so easy to work that you can probably hand plane it to thickness without too much trouble.

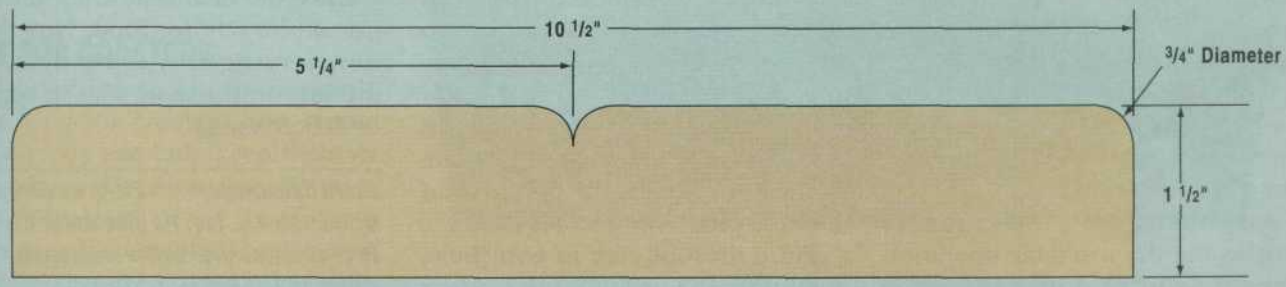
In either case, you should make sure all the cutting tools you're using are at their sharpest state because the fibers of softwoods, like pine, tend to compress rather than cut when worked with dull tools. This compression leads to crushed **edges** instead of the sharp edges that are formed when sharp tools , are used.

If you elected to resaw the **boards,** you'll have to either finish plane or power sand the boards to

DIAGRAM 1



End piece with dimensions for handle cut outs.



Front and back pieces with dimensions for decorative saw work.

their final thickness. I used a belt sander for this operation. The job went so quickly that the boards were down to their finished size almost before I realized it.

Cut the base to its finished length of 10", then set the rip fence on your table saw for the *5 1/4"* width. Without changing the saw setting, rip another piece at least 7" long to the same 5 1/4" dimension. Cut this board into two pieces, each measuring 3 1/2" long x 5 1/4" wide. These two pieces will be used as the tray's ends.

Rip a pair of boards measuring at least 11" long into 1/4" widths to become the sides of the tray. Don't cut these sides to length at this time.

Before you go any further, you need to lightly touch up all the cut edges of the parts with some fine sandpaper. Be careful not to round any edges, just take off the fuzzies that formed when the cuts took place. Once this is done, your parts will be as clean as possible and ready for dry assembly.

Dry assembly is the act of putting the pieces together without any glue or fasteners to ensure everything is of the proper size. If you've never done this operation before, you should find this project to be a good opportunity to test it out.

Dry assemble the tray by butting one end panel against each end of the base board. Make sure the end panels are square to the base, and set a single side panel in position. Mark that panel for length, and cut both of the 1 1/2"-*wide* side panels to the same length. Touch up the cut edges with fine sandpaper, being careful not to round the edges.

Referring to the sketches, lay out the curved areas on the two end panels and two side panels. Instead of using a compass for the layout work, I found a drafting circle template works well and doesn't leave any holes from the compass pin. Cut the curves to shape, then drill a

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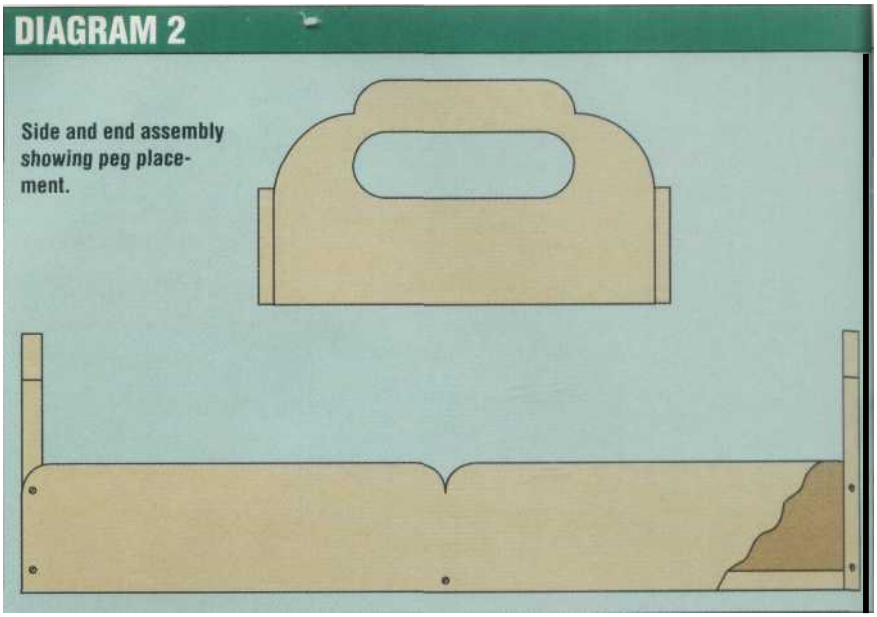

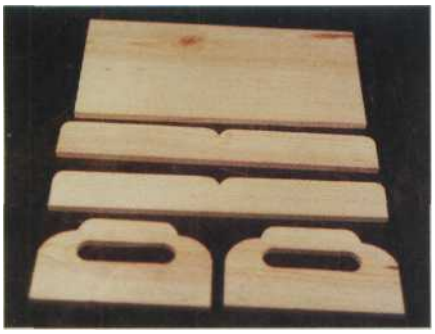

The parts for the tray are completed and laid out prior to assembly.

pair of 3/4"-diameter holes in each of the end panels for the finger cutouts. Use a coping saw, scroll saw, or jigsaw to cut out the finger openings in these two panels.

Lightly sand all pieces in preparation for final assembly, then dress up the cuts just made. Don't round any edges at this time.

Assembling the parts is just as easy as the dry assembly operation because you're doing the same steps, with the exception that this time you'll be using glue to hold the parts together. Set up for the assembly operation by getting your clamps set to the approximate openings and preparing your clamp blocks for use. Clear your work area, and have a container of water and a rag available for wiping up any excess glue.

Now you're ready to start. Apply some yellow woodworker's glue to the edges to be joined and butt all the parts together. A few light-duty clamps are all that are needed to hold the details in place.

Once the glue has completely dried, it's time to install the round pegs that help make this project unique. The pegs are nothing more than round wooden toothpicks that have had the tapered ends cut off, then cut into two equal length pieces. The toothpicks I used needed only a #40 drill hole for a good fit, but you should check your toothpicks before drilling.

The holes should be drilled about 5/8″ deep at the locations shown in the drawing. The pegs' exact locations aren't important. You also can create any pattern you choose to get the effect you want. I used only five pegs per side because the tray will be subjected to very light duty, but you could easily adjust the number to suit your own opinion on how the piece should look.

Put a drop of glue in each hole, then push the peg into place. Allow the glue to cure completely before trimming the pegs to length.

Trimming can be done with a sharp knife, a "setless" saw (like a backsaw), a chisel, or a belt sander. I chose a sharp chisel to get the pegs to the proper length, then touched up their ends with fine sandpaper.

At this time, you should dress up all the exposed edges on the assembly with sandpaper to remove the sharp areas. Pay particular attention to the end panels that will receive the most handling. It won't take too much effort to complete this step. Before you know it, you'll be ready to apply the finish.

I used a clear, water-soluble finish that's environmentally safe. Regardless of what you select for this job, you should follow the manufacturer's recommended application procedures to get the best results.

My directions called for three coats of finish with light sanding between coats. It definitely took more time for the coats to dry than it did to apply them, but the results were worth it.

Once the final coat dries, the finish will be safe for food. Now your new serving tray is ready to sit proudly on the table with its supply of delicacies.

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CRAFTY COMPUTER DESK

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For most computer owners, finding a desk with enough space for all the computer's components plus enough room to work is a challenge. While many models are on the market, most are made of pressed wood products lacking any redeeming aesthetic qualities.

This computer desk was carefully designed to satisfy the need for a functional work space and the desire for quality furniture.

A typical computer system has four basic pieces: a hard drive unit, monitor, keyboard and printer. These pieces must be hooked together with an array of plugs and cables. Through the pictures, drawings and text, you'll see how this center has been designed to accom-modate these parts and hide unsightly cables.

The computer center consists of a desk and a hutch. Each is built as a separate unit, then assembled to complete the design. For both units, you will use 3/4″ solid oak lumber, 3/4″ MDF oak and 1/44" oak ply-wood. The solid oak is available in any length; the MDF and oak ply-wood come in 4' x 8' sheets.

A rule every experienced wood-worker lives by is "measure twice, cut once." Even though you're get-ting the most exact measurements possible, you should double check before cutting.

To begin, build the desk face frame from oak stiles and rails **(parts A-F),** using **diagram 1** and the **Materials List** as a guide. Special consideration should be given to the location of the shelf rails to accommodate your computer's

DIAGRAM 1

Materials List

Desk

Desk Face Frames (¾" solid oak)

A	2 ends	1⅝" x 29¼"
B	1 middle	1⅝" x 27⅝"
C	1 top	1⅝" x 53¾"
D	1 divider	1" x 20"
E	2 dividers	¾" x 20"
F	1 base	2¾" x 20"

Desk Bulkheads (¾" MDF oak)

G	2 outer	23¾" x 29¼"
H	1 inner	23¾" x 29¼"
I	1 back rail	2⅛" x 33"

Desk Shelves (¾" MDF oak)

J	3	22½" x 23⅜"

Drawers - (Overall 19" x 22", allowing ½" each side for the drawer slides.)

Top Drawer (¾" MDF oak)

K	2 sides	2⅜" x 22"
L	2 ends	2⅜" x 17½"
M	1 bottom	¼" oak 18⅛" x 21⅛"

Printer Drawer (¾" MDF oak)

N	1 side	2" x 22"
O	1 side	11" x 22"
P	2 ends	11" x 17½"
Q	1 bottom	¼" oak 18⅛" x 22¾"

Drawer Fronts

R	1	1¾" solid oak 3¼" x 20½"
S	1	1¾" solid oak 12¼" x 20½"

Pull Out (¾" MDF oak)

T	1	19⁵⁄₁₆" x 20"
U	1	¾" x ¾" x 20½" solid oak

Guides (glue 2-¾" pieces together)

V	2	1½" x 2" x 17" (⅝"x⅝" rabbet)

Stop Piece

W	1	¾" x ¾" x 17"

Desk Top (¾" solid oak)

X	1	25½" x 59"

Hutch

Face Frame (¾" solid oak)

AA	2 ends	1⅝" x 37¼"
BB	1 middle	1⅝" x 22¾"
CC	1 top	2½" x 53¾"
DD	1 left bott.	1⅝" x 24⅜"
EE	1 right bott.	1⅝" x 27¾"

Bulkheads (¾" MDF oak)

FF	2 outer	12¾" x 37¼"
GG	1 inner	12¾" x 25¼"

Fixed Shelves (¾" MDF oak)

HH	1 shelf	12⅜" x 26"
II	1 shelf	12⅜" x 30¼"

Adjustable Shelves

JJ	1	12¼" x 25"
KK	2	12¼" x 29¼"

Inner Rails (¾" solid oak)

LL	1	2⅛" x 29½"
MM	1	2⅛" x 25¼"

Base Molding (¾" solid oak)

NN	1	2" x 60"
OO	1	2" x 30"

Hutch Crown Molding (¾" solid oak)

	1	⅞" x 62"
	2	⅞" x 16"

Top (¾" solid oak)

PP	1	14¾" x 59"

Doors (¾" solid oak)

Panels

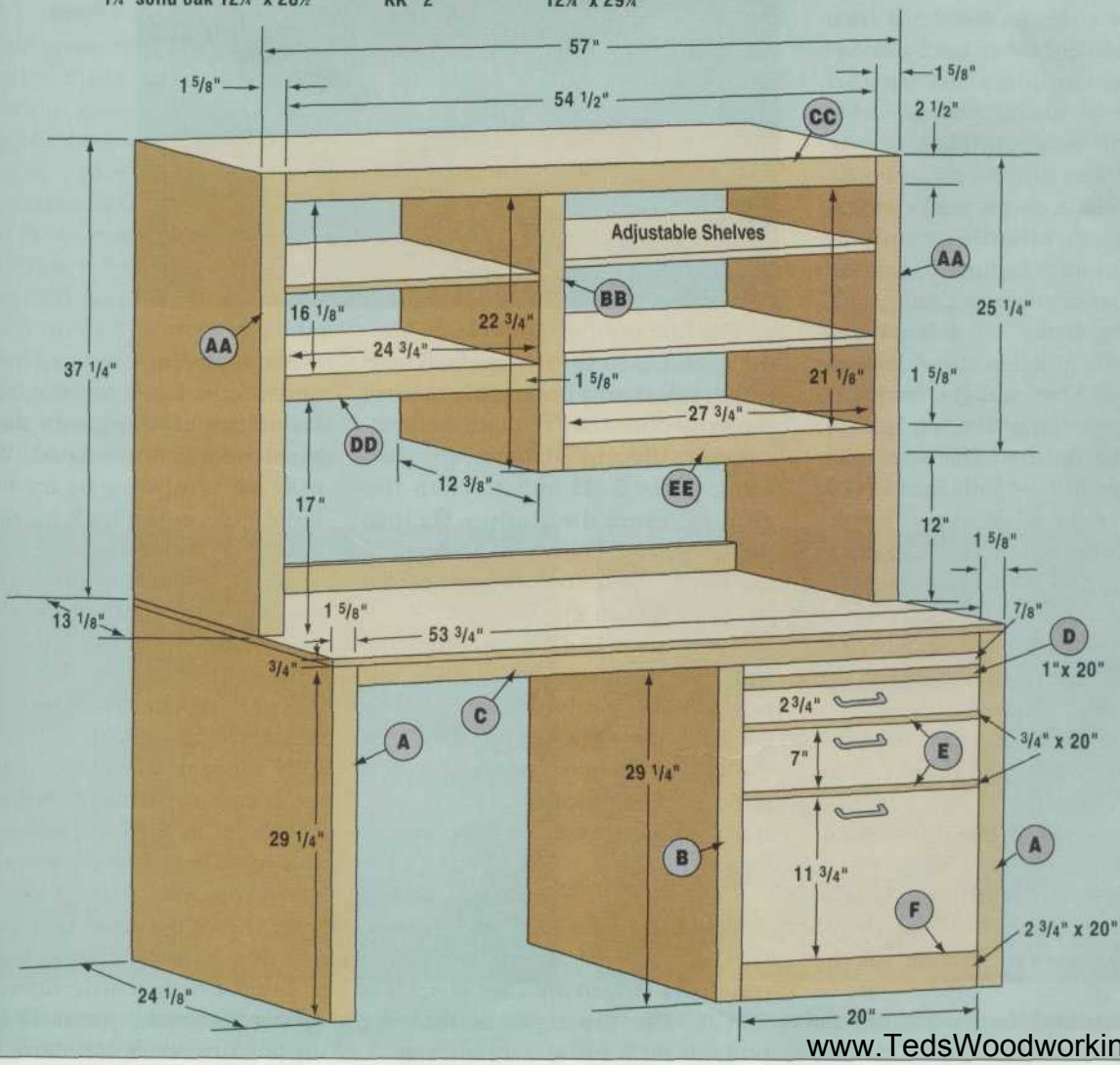
2	8¾" x 12⁹⁄₁₆"
2	10⅜" x 17¾"

Frames

4 Rails	2⅛" x 8¹⁄₁₆"
4 Rails	2⅛" x 10⅛"
4 Stiles	2⅛" x 21⅝"
4 Stiles	2⅛" x 16⅝"

Drawer Hardware

1 Set	22" full extension
1 Set	22" heavy duty full extension



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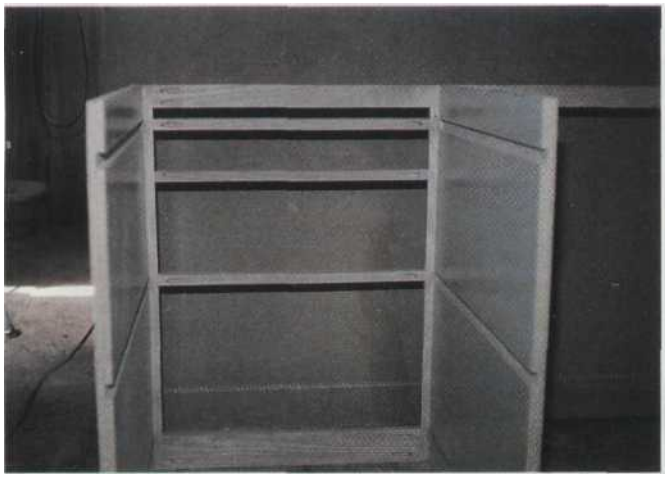

1 Mirrored dadoes in the drawer bulkheads are ready to receive the drawer shelves.

2 The assembled drawer section with shelves in place. The face frame has already been glued on.

hard drive unit and printer. If you find the spaces inappropriate for your system, adjust the spacing accordingly.

There are a number of ways to attach the stiles and rails to form the face frame, but we used a doweling jig as the simplest option. Remember to lay out your doweling lines exactly before drilling.

If you'd like to try a different fastening method, screw pockets using a Kreg jig works well not only for the face frame attachment, but also for the carcase construction.

Once the frame has been assembled and the glue has dried, remove the clamps. Flat sand the back side joints to get a flat gluing surface.

Using the finished face frame, lay out the two drawer bulkheads (G & H) to make the *3/8"* dado cuts for the shelves **(photo 1).** The top dado holds the shelf to support the pull out board. The second dado is for the hard drive unit's shelf. The bottom dado houses the shelf for the bottom printer drawer.

Spacers will be needed on both bulkheads to allow the drawer slides to clear the face frame. You may need to custom fit the thickness of these pieces.

On the outside bulkheads (G), cut a 3/8″ x 3/8″ rabbet on the inside rear edge to accommodate for the 1/4″ back.

Before assembling, pre-sand the visible sides of the bulkheads and the 1/4" oak used for the backs. These pieces are almost impossible to sand properly once they're put together.

3 The three backs in the desk unit shown in place. Notice the wire chase hole for the printer drawer.

Assemble the drawer section using parts G, H and I. Then use glue to insert the shelves (J) into the dadoes in G and H. Clamp the assembly, check for squareness and let it dry **(photo 2).**

Next, glue and clamp the face frame to the assembled drawer section and the left bulkhead (G). Finish nail the back rail (I) between the two bulkheads. The back rail is important for supporting the knee space section and the 1/4" plywood back.

Using 1 1/4" finish nails, attach a 1/4" x 33 3/4" x 29 1/4" piece of oak plywood to the back of the knee space **(photo** 3). Attach another piece 5" x 22 1/2" to the top right behind the pull out shelf and the top drawer.

Since all the computer's components must hook together with the hard drive unit, space for the cables must be accommodated. While it may be tempting to try to cut a large hole in the back for this area, it's actually easier to leave the entire space between the top drawer and the second shelf open to allow access for hooking up the hard drive unit.

Enclose the area behind the printer drawer with a 1/4″ x 15 1/4" x 22 1/2" piece of oak plywood. Cut a 3" hole in this piece to match the hole you'll cut in the back of the printer drawer. These holes are essential to allow for cable passage and to prevent the cables from tangling when the drawer is opened or closed.

Build two box style drawers **(diagram 2)** using parts K-Q. The upper drawer is standard, but the

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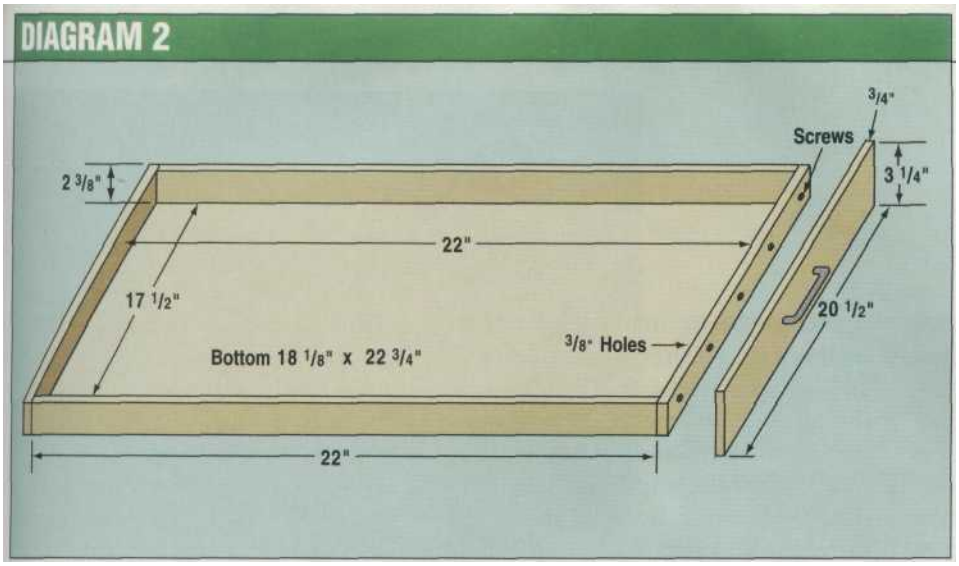

printer drawer has been designed to allow easier access to the printer and paper. Three sides of the drawer are 11" high, but the left-hand side is only 2".

When making the drawers, dado 1/4" x 3/8 deep, 1/4″ up from the bottom of the sides and ends to allow for the 1/4″ bottom. Use glue and nails or an air powered stapler to attach one end and two sides. Then slide the bottom into the groove and attach the last end. Square the drawer and turn the box upside down, running a heavy bead of glue around the bottom's inside.

The drawer fronts (R & S) are constructed from solid oak. The smaller front can be created from a single piece, but the bottom front will probably need to be glued-up. Alternate the growth ring pattern on the end grain of the boards to prevent bowing. Pay attention to the grain pattern while you're arranging the drawer fronts.

Glue-up the pull out board made of MDF oak (T) with a 3/4″ oak piece (U) glued on the front edge. Before you start gluing, cut a finger pull on the underside of **part T,** using either the table saw or a cove bit in a router.

Next, cut the rabbets in the pull out guide pieces (V). When in place, these will act as the top guide for the pull out. The top shelf will be the bottom guide and support, thereby creating a slot for the pull out to ride in **(photo 4).**Corner braces in three of the four corners add stability to the unit and will fasten the top.

Screw the stop piece (W) to the top of the pull out board at the desired length. The pull out board and the desk top will be easier to finish unassembled, so don't glue the stop strip to the pull out.

The top of the desk (X) is fashioned from multiple oak boards. The lumber you have available will determine how many pieces will be necessary for its construction.

Joint the edges to be glued, then glue and clamp, making sure the top will dry on a flat. Again, pay attention to the growth rings while gluing.

Unless you're fortunate enough to have a multitude of double clamps, it's important that you alternate them about 8" apart (one on top, the next on the bottom, etc.) to keep the top flat **(photo 5).** When dry, the top is sanded with a random orbital sander and smoothed with a palm sander.

Next, attach the top. (Even if you finish the top unattached, you should attach it now to make final assembly easier.) To attach the top's back right-hand side, use a hole saw or expansion bit to create a 3" hole in the top shelf, then drill a 3/16" pilot hole in the right back corner brace. This gives you accessibility in fastening the desk top through the shelf to the corner brace.

On the right front side, drill a 1/2″ hole about halfway through the top front rail. This pocket will give you

4 The pull out board is shown in place with a top guide (V) being held in place with squeeze clamps.

5 Alternating clamps help keep the glued-up top level while drying.

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room to maneuver your screwdriver or drill. Make a 3/16″ pilot hole the remainder of the way for the screw. Attaching the left side is easier. Simply screw through the corner braces into the desk top.

An effort was made to maintain as much desk top working space as possible, so the keyboard was placed underneath it on a slide-out unit. There are a variety of options for the keyboard's hardware. The type shown **(photo 6)** is mounted on a board measuring 1 1/2" (or thicker) x 6" x 17", which in turn is mounted to the top's underside in the center.

The hutch's design gives special consideration to space utilization. Computer monitors, like hard drive units, are being made bigger than in the past, so they require at least 17" in height. On this hutch, only the left side was made this height to provide maximum storage for office and computer supplies. You may prefer to make both of the shelf units equal in height.

The hutch's construction is similar to the desk's, with rails and stiles **(parts AA-EE)** fashioning the face frame. Using your face frame, mark the position for the 3/8″ shelf dadoes on the bulkheads (FF & GG). Again cut a 3/8″ x 3/8″ rabbet on the rear inside edge of the outside bulkheads (FF) to accommodate the *1/4"* back. The two back pieces (30 1/4" x 37 1/4", 26" x 37 1/4") will meet and overlap the inner bulkhead edge.

The hutch's bottom stationary shelves (HH & II) are flush with the top of the bottom face frame rails. Do not cut dadoes for the adjustable center shelves (JJ & KK).

Glue in the top rails (LL & MM) and the hutch base moldings (NN) to the inside of the back. Make sure the piece is flush with the inside of the back rabbets.

Next, cut out and glue-up the hutch top (OO). Again, remember to pay attention to the growth rings.

If you prefer not to use solid oak, make sure your crown molding covers the unfinished edges.

Next, glue the crown molding to the front and both sides. You can make your own crown molding if you have access to the proper equipment. If not, you can purchase preshaped crown molding from a local lumberyard.

Make sure your corner miters are tight before you start gluing. Attach the hutch top by gluing and clamp ing, or you can use some strategically placed screws through the front and back rails.

The doors depicted on this hutch are fashioned in the popular raised panel mode. In case of expansion, it may be beneficial for you to stain the interior of the panel prior to assembling rather than after, since the stain may not cover the unexposed areas.

6 The keyboard retracts under the top to allow for a cleaner desk top. Notice the cable running into the side of the drawer section.

7 The edge view of the door shows the through tenon and groove used to assemble the stiles and rails.

8 The back of the door shows the dadoes cut to receive the hinges.

9 This detailed photo shows the hole cut in the drawer section's left bulkhead for the keyboard wire.

The stiles and rails for the door are made on the shaper using a standard 1/4" tongue and groove **(photo** 7). Although some woodworkers find a 3/8″ or 1/2″ tongue and groove make the door stronger, the 1/4″ is sufficient. Use the sizes given in the **Materials List** to cut out and assemble the doors.

To fasten the doors to the cabinet, a knife hinge (pivot hinge) gives a more finished look. To make the hinge grooves, use a 1/4" dado blade in your table saw raised 9/16". The groove is 1 3/4" long for the type of hinge shown **(photo 8).** Always check the manufacturer's instructions for specifications.

A 1/2″ round over bit in a router was used to shape both the ends and fronts of the hutch and desk top. Shape all the edges of the doors and drawer fronts to your own style. Run a profile on the rest of the base material, then glue to the desk and hutch.

Attaching the hutch to the desk base is one of the easiest tasks. Simply drill pocket holes angled through the outside of the hutch back and screw in with face frame screws.

Now you're almost finished, with the exception of a couple modifications to allow the computer system to be hooked together.

To accommodate the cable from the keyboard to the hard drive unit, cut a 1" hole in the left side of the drawer section **(photo 9)** at the level of the hard drive unit shelf.

Next, cut a 2" hole in the back of the hutch to access the cable from the monitor to the system. The monitor will cover the hole nicely and isn't readily visible.

If you opt to cut the hole in the top of the desk, you will need to make the 1" hole in the drawer section larger (at least 2" to allow for the cable attachments).

Complete the entire piece using your favorite stain and preferred finish.

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CAPPUCINO BAR

Materials:

white pine 2" x 6", 8 feet long
3/4" and 1/2" dowels, 3 feet each
circular saw
drill
3/4" and 1/2" drill bits
2 or 3 large C-clamps
hammer
2-1/2" drywall screws
heavy-duty picture frame hangers
paint
polyurethane stain
measuring tape
black paint
coarse, medium and fine sandpaper
small scrap block of wood
wood glue

Note: Before tackling this project, practice drilling on some scrap 2" x 6" wood pieces to see how straight you can make a hole. Always wear safety goggles when using the drill or saw.

Steps:

1. Place the pine on the work table and measure 21 inches from the end that has the flattest cut. Put the straightedge on the board, diagonal from one corner to the other, and draw a cut line. Use the clamps to hold the wood down while cutting, and manipulate the wood in order to make a clean cut with the circular saw.
2. Put the cut piece on top of the other like a sandwich, so the widest end is now the top of the base for the shelf.
3. Make a pencil line along the sandwich edge to match the other.
4. Un-sandwich, re-clamp and cut along the line.
5. Cut the top, measure 29 inches from the edge and draw a cut line. Cut with circular saw.
6. Pick the side that will look the best for the front, and measure 2" from each end, measuring in towards the center. Mark. Draw a line from both of these to the back corners. Clamp and cut these two lines.
7. At the widest end (the top), find the center along the side where you are to insert the 3/4-inch dowel and mark. From this marked point, measure down the side 2-1/2 inches twice, then one inch back toward the uncut end, which is the back. These are the other two dowel marks. Clamp both pieces together like a sandwich.
8. Fit the drill with the 3/4-inch bit and with a steady hand, drill through both pieces as straight as possible.
9. Repeat for 1/2-inch dowels using the 1/2-inch drill bit.
10. Cut the 3/4-inch dowel to 20 inches and the two 1/2-inch dowels to 12 inches.
11. Sand all pieces with coarse, medium and fine sandpaper.
12. At the bottom of the base, if the edges are too sharp, wrap sandpaper around a block of wood and sand it flat.
13. Assemble the two sides of the base, with the top down, and set on the table. Feed the dowels through the holes and center each one. Use the scrap pine for the spacer in between the two sides. Mark each dowel and slide out to glue, then slide back to the marks and twist, spreading the glue. Allow to glue to dry for at least an hour.
14. Lay the newly glued base flat on its back with the spacer underneath, center the top next to the top base, and mark two pilot holes for each side, two inches apart. Mark and drill the four pilot holes, all the way through to the base.
15. Spread some glue on the tops of each base, reposition and screw together.

16. Turn over and find the center, mount the hangers 16 inches on center from the center mark on the back.
17. Finish by masking out the dowels on the base and painting the them with black paint. Apply a polyurethane stain and let dry overnight.

CHINA HUTCH

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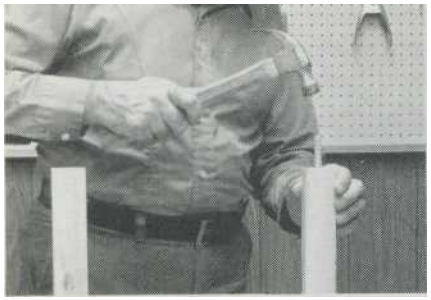


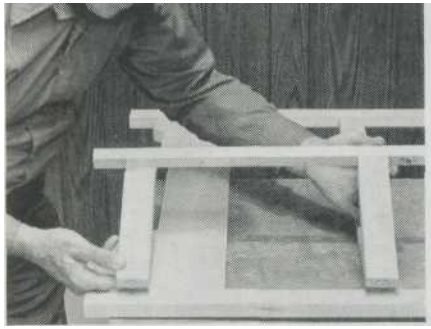
The frame sections of the china hutch are assembled with the aid of glue and spiral dowels. Dowel centers are recommended to ease matching of dowel holes.

lectibles? Here's the perfect cabinet for you, with lots of transparent glass to show off your treasures. It even has an elegantly wallpapered hacking that can be changed at will. Select the decorative hardware to match the decor of your room—bright, brassy and modern or dark and intricate Mediterranean, or even sleek Oriental. You'll find a wide variety of handles and drawer pulls in all styles at any good hardware shop.

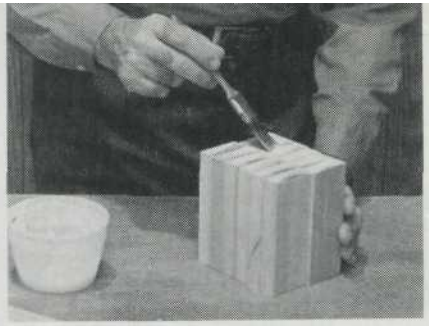
Choose flat defect-free boards in the wood of your choice tor the frame. Rip them on the table saw into strips 13/4" wide. Remove all saw marks with a plane or jointer. Do not

you will need three strips cut to 28 1/2". These are tor the crosspieces. You will also need one piece 5 3/4" x 28 1/2" to be used for the lower section.

Drill dowel holes as indicated; the use of a doweling jig and dowel centers is recommended. Mark of! the hole locations and drill into the ends of the crosspieces. Make the holes 3/8" in diameter and 1 1/16" deep. Because of the narrow width (1 3/4") use only one dowel per joint. The jig will automatically center the hole. After drilling the crosspieces, use dowel centers to transfer the hole locations to the uprights. Use two dowels for

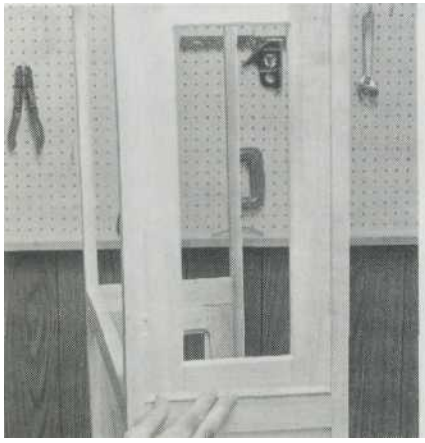


This photo more clearly shows how locating pins are used to transfer the dowel holes from the edge to front of frame. Use bar clamps till glue dries.

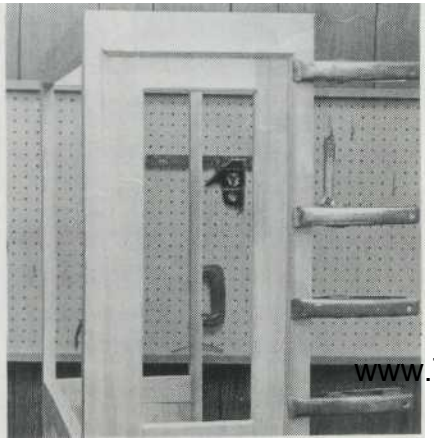


Shown here is how the end grain of the crosspieces are given a sizing coat of glue. Sized glue is made by mixing equal measurements of glue and water.

The upper, center, and lower panels are assembled with glue and nails. Pilot holes are drilled before nailing to prevent the thin wood from splitting.



The edges of the panels are dressed up



The inside edges of the panels must be

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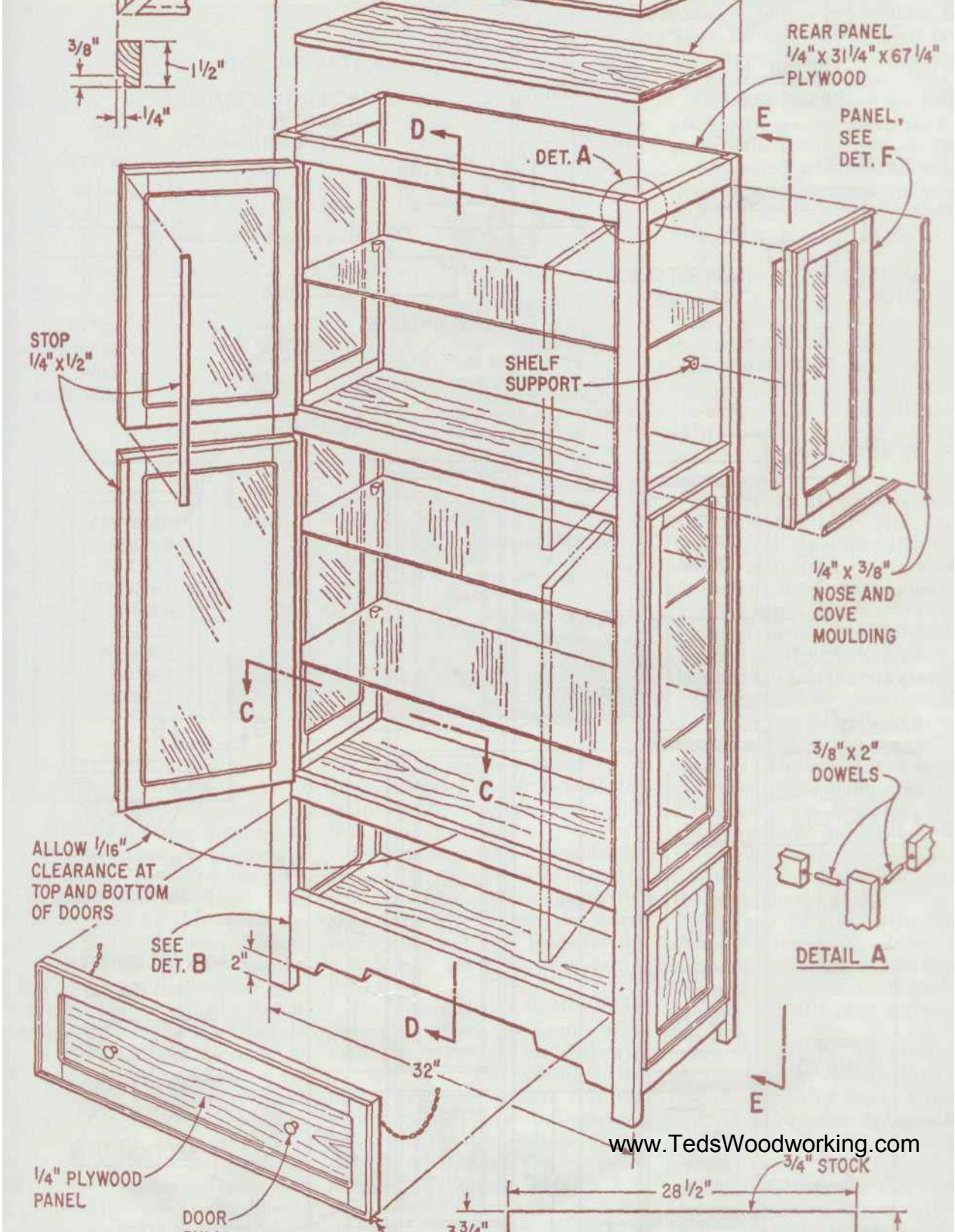

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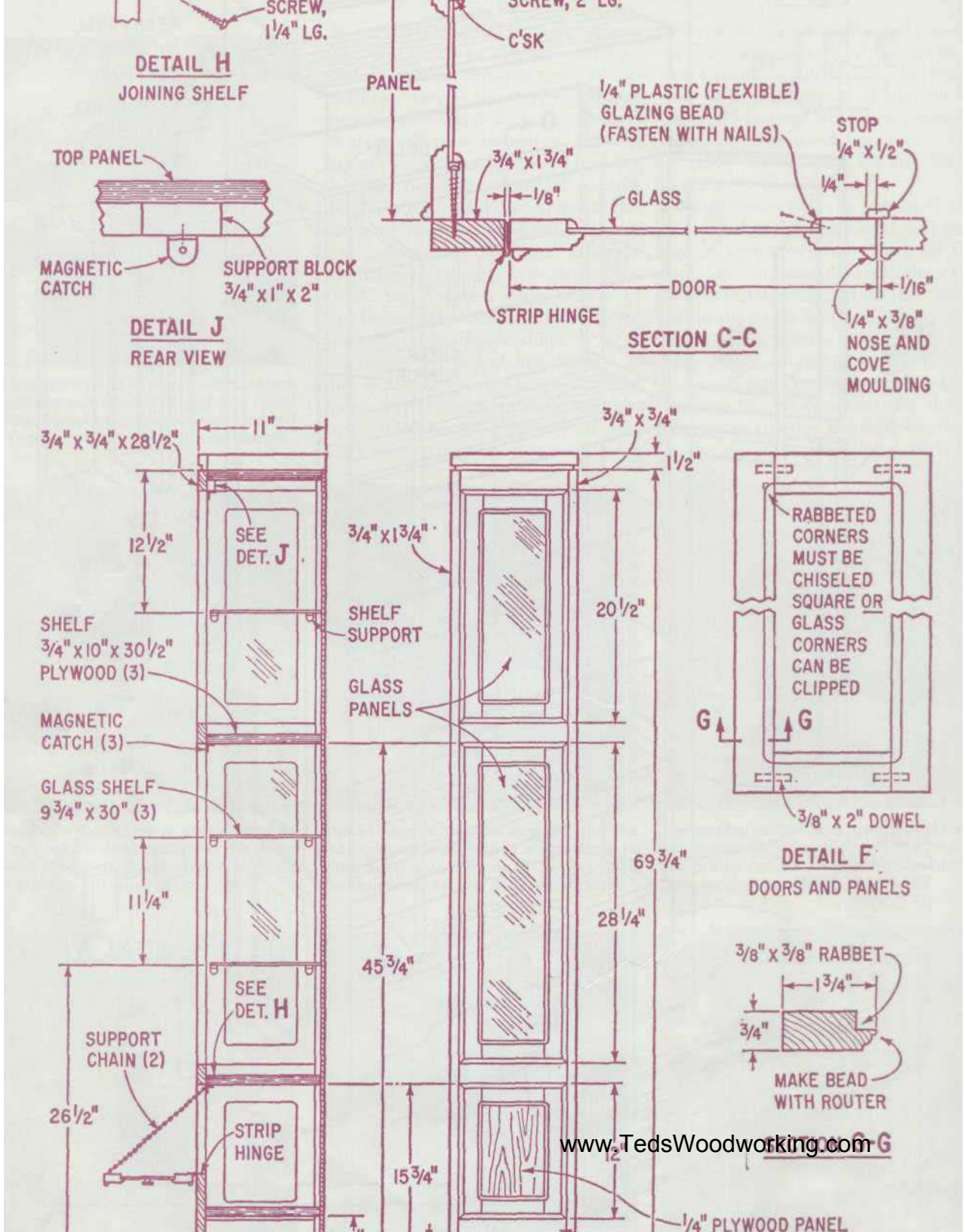

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BILL OF MATERIALS

QUANTITY	SIZE AND DESCRIPTION	PURPOSE
2	3/4" × 1 3/4" × 69 3/4"	Front stile
2	3/4" × 3/4" × 69 3/4"	Side stile
3	3/4" × 1 3/4 × 28 1/2"	Front rail
1	3/4" × 5 3/4" × 28 1/2"	Apron
8	3/4" × 1 3/4" × 9 1/2"	Side rail
2	3/4" × 1 1/2" × 11"	Side cap
1	3/4" × 1 1/2" × 32"	Front cap
1	1/4" plywood, 31 1/4" × 62 3/4"	Rear panel
4	3/4" × 10" × 30 1/2"	Shelves
4	3/4" × 2" × 20 1/4"	Upper side panel
4	3/4" × 2" × 28 3/8"	Center side panel
4	3/4" × 2" × 12 1/8"	Lower side panel
12	3/4" × 2" × 9 1/2"	Side crosspieces
4	3/4" × 2" × 20 1/8"	Upper door stiles
4	3/4" × 2" × 28 1/4"	Center door stiles
8	3/4" × 2" × 14 3/32"	Door rails
2	3/4" × 2" × 28 3/8"	Lower door stiles
2	3/4" × 2" × 7 7/8"	Lower door rails
1	1/4" × 4 3/4" × 24 1/4"	Lower door panel
2	1/4" × 3/8" × 60 ft.	Nose & cove molding
2	1/4" × 6 1/4" × 8 7/8"	Lower side panels
1	1/4" × 1/2" × 48"	Door stops
	8 ft.	Strip hinges
6		Pulls
3		Magnetic catches
	3/8" × 2"	Dowels
	40 ft.	Glazing bead, plastic
12		Shelf pegs

Also: have glass pieces cut to fit frames.

the wide bottom piece.

Before assembling the parts to make up the frame section, prepare the clamps by opening them up to size; also have some scrap strips of wood at hand for protecting the work surface from the clamp jaws. Bar clamps are ideal for this operation. Dab some glue on the dowels, insert into the drilled holes, then coat the mating surfaces with glue and join. Use adequate pressure on the clamps to force glue from the joint, but do not overtighten. Check the frame to be certain that it is square, then set aside while the glue dries.

Prepare the side crosspieces and the rear uprights. These are drilled and assembled much like the front frame, the only difference being that the depth of the dowel holes differs. The holes are drilled 1 1/2″ deep into the 9 1/4" crosspieces and 1/2″ deep into the uprights.

After drilling the necessary holes the uprights are only 3/4" X 3/4" in cross section, a double pass on the table saw **is** recommended rather than using the router.

The side frames are assembled by gluing the crosspieces to the rear uprights. These are then glued to the front frame. Again, use the dowel centers to locate the holes for the dowels from the crosspieces to the front frame.

The frame at this stage will be somewhat flimsy, so handle with care. The addition of the shelves is the next step. This will make the frame rigid and strong. Cut the frames to size, then drill diagonal holes through the bottom of the three lower shelves. The top piece is drilled from the top side. Use 1 1/2" round head (RH) screws to attach the shelves.

The frames for the doors and side panels are made next. Cut the necessary pieces and assemble them with the router later on when making the rabbets for the glass.

The side panels will be held in place with screws which must not show in the finished cabinet. This is accomplished by drilling screw holes in the rabbeted area where the glass molding will conceal them. Drill the holes before assembling the panels.

When all the panels are assembled, rabbet them lor the glass and cut the decorative bead using the router. Sand all edges and surfaces, then install into the frame. The nose and cove molding is added using glue and spring clamps to hold them in place. Miter all corners and use care not to mar the molding surface. A piece of felt glued under the clamp jaws is recommended.

Door panels are made with sufficient allowance for the strip hinges. The left-hand doors have a door stop added. The right-hand doors are beveled at the left edge to clear the other door. When installing the strip hinges, use only the end holes until you have cheeked fit. If fit is okay, you can then add the balance of the screws.

The bottom door which opens horizontally is treated in the same manner. Instead of glass, it has a 1/4″ back panel. In addition, it has an insert to improve its appearance. This insert is simply a piece of 3/8" solid lumber which drops into the panel opening.

Add the plywood inserts to the bottom panels of the side pieces. These are glued into place.

Next add the decorative strips around the top of the cabinet. This is made by rabbeting a long strip of 1 1/4" stock which is then cut apart and mitered. Hold it in place with **screws** and glue.

The rear panel of 1/4″ plywood is *not* nailed to the cabinet. Instead it is screwed so that it can be removed as desired to change the decorative paper background. Use round head serews.

Drill the holes for the various pieces of hardware. Mount and check fit. Remove hardware when applying finish, then replace.

Finish the cabinet as desired. You can stain the wood and top with sev

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CORNER DISPLAY CABINET

ALTHOUGH it looks complicated, there are short-cuts that take much of the hard work out of the project. First is use of readily available decorative molding strips; second is use of flexible wood tape to cover exposed plywood edges. The fancy scalloped curves on side pieces, fringe, and skirt can be cut with a power jig saw or saber saw, and if you clamp the two side pieces together you can use a wood rasp and sandpaper to get exactly-matching curves.

The entire cabinet is made of 1-inch thick veneered plywood, except for the door facings. These are 1/2-inch plywood. Use the veneer surface of your choice (birch, ash, mahogany, walnut, etc.) and buy wood tape to match.

Cut out the two back pieces. Note that one panel is 21 inches wide, the other is 20 3/4 inches. Rabbet the front and back edges of the narrower panel as shown in Detail A. Now cut out the bottom, top, intermediate top, and the shelves. Make up full-size patternsfor the side piece scallops (or use those available as noted at the end of this article), trace them on the rectangular side pieces, and cut the wood to shape. Clamp the side pieces together as noted above, and trim to smooth, fair curves.

Make up the spine from 3/4-inch plywood (or hardwood), and bevel each side to a 45° angle. This gives added strength to the back joint.

Use glue on mating surfaces, and fasten the two back panels together with 1/4-inch #8 flat head wood screws. Be sure to drill pilot holes for all screws, and countersink for the heads. Next install the spine and the top panel with 1 1/4-inch #8 flat head wood screws, after coating the mating surfaces with glue.

Rabbet the rear edges of the two side pieces, and install them as shown in Detail A. Now you can install the bottom panel, the intermediate top, and the upper shelves. Cover the exposed edges of the shelves with wood tape before installation, and be sure that all these panels are square with the back

and side pieces. Again, use glue on mating surfaces, and fasten with l 1/4-inch flat head wood screws.

Make up a cleat of 3/4 X 3/4-inch pine stock, as shown in the exploded perspective drawing. Install it underneath the intermediate top, and fasten the apron to it. The face of the apron should be flush with the edge of the intermediate top.

Cut out the two spacers from *7/8" X* 7/8-inch pine or other hardwood stock, and bevel one side of each to a 45° angle as shown in Detail A. These spacers are installed along the front edge of each side piece, bottom and intermediate top panels.

Use full size patterns for the skirt and fringe pieces, cut the pieces out, sand the curves smooth, and install them. The fringe goes under the front edge of the top panel, and the skirt goes under the front edge of the bottom panel. Make cleats of 3/4 *X 3/4-inch* stock as shown in the exploded perspective view, and install them behind the fringe and skirt pieces. Cover the scalloped edges with flexible wood tape.

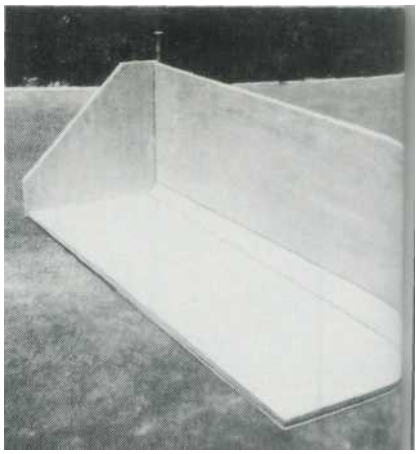
Now install the decorative molding at the top and intermediate top. Bevel the corners and use the same trim along the sides. Use glue and small brads to fasten the molding in place. Set the brad heads below the surface of the wood, and cover with matching wood filler. Cut out and install the cabinet shelf in the lower compartment after covering the front edge with wood tape.

Make up the two doors from 3/4-inch plywood, with /2-inch plywood facings and decorative molding around the edges as shown on the plans. Note that corners of facings and moldings must be mortised carefully for a snug fit. Round the edge of each door on the side opposite the hinges, and cover the exposed top and inner edges with wood tape

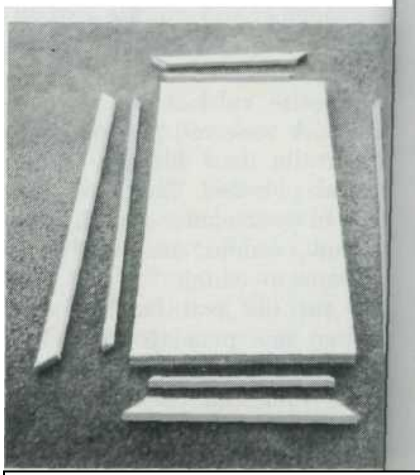
. For hinges, use the new knife type used by radio cabinet manufacturers. These come in left hand and right hand models, and they feature stops that prevent the doors from swinging all the way back. See Detail B for hinge and door relationship.

Finally, sand the cabinet lightly, and finish with two coats of varnish or other clear coating to bring out the natural beauty of the wood. Sand lightly between coats, and if additional coats are needed, sand before application. When the final coat is dry, install the doorknobs of your choice, and the project is done.

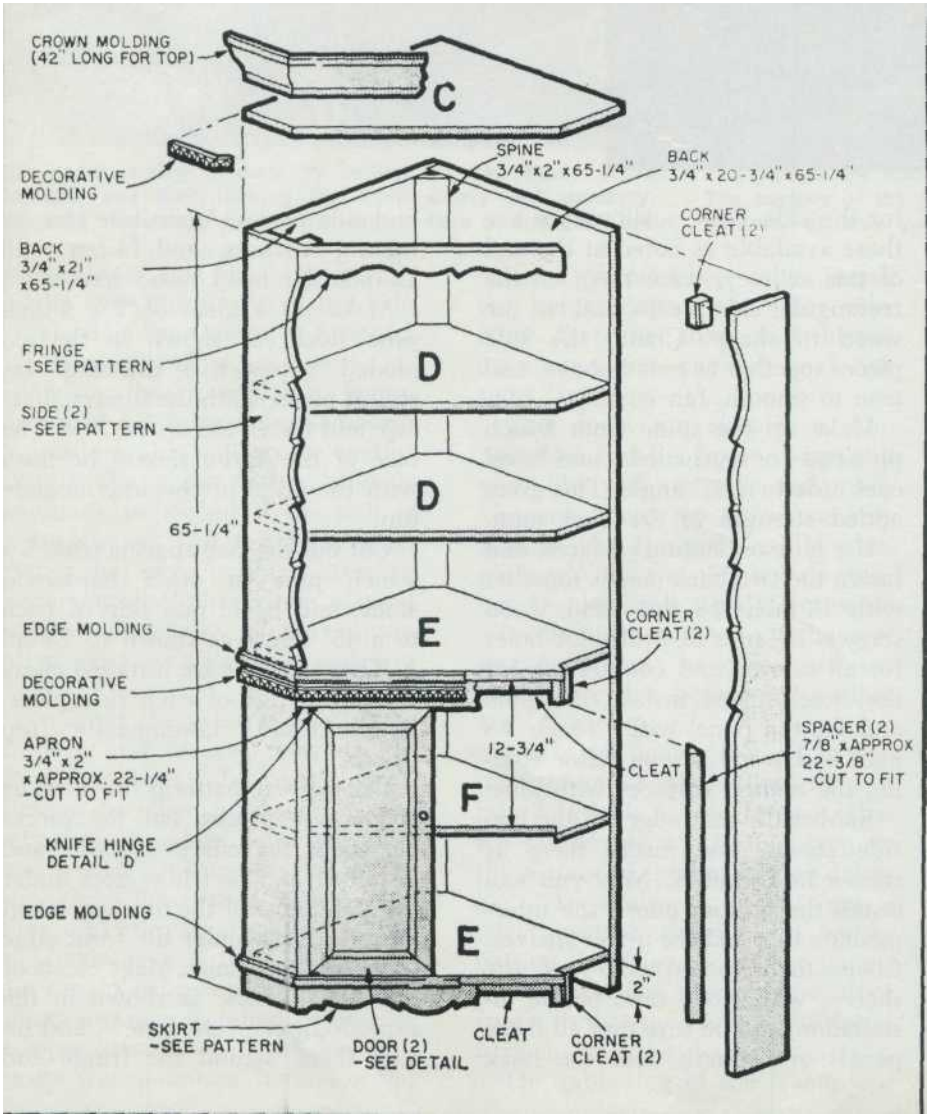
Shown here are the assembled back top and spine. The spine is beveled each side to a 45 degree angle, and gives strength to the back join



Put in the intermediate top, apron and shelves, covering shelf edges tape. Next is fringe and skirt, plus molding on top and intermediate top



Attach door facings with glue, and wood screws. Work from backside door. The corners and facings must be mortised carefully for a snug fit



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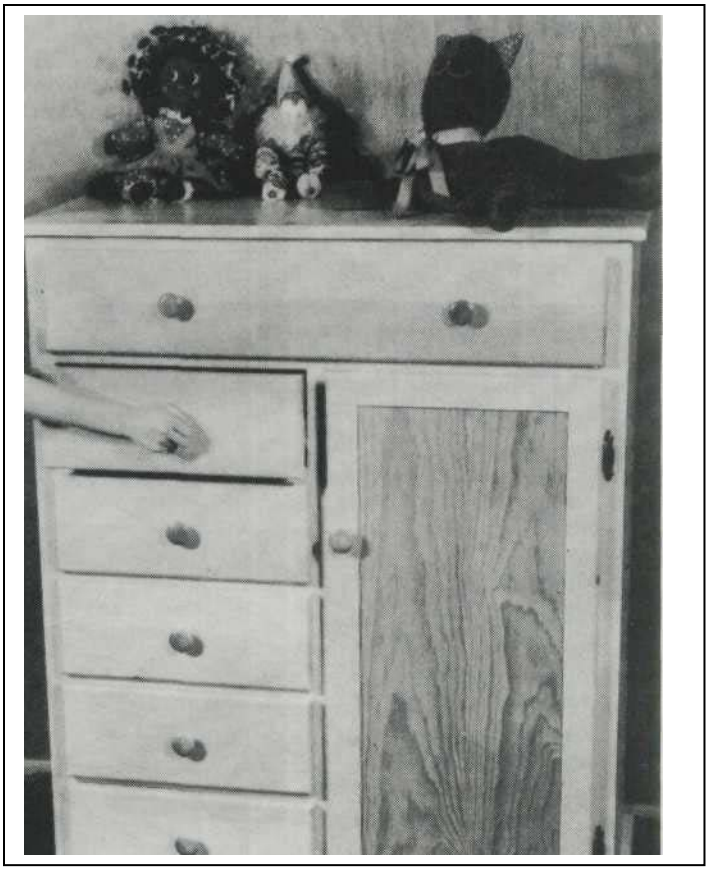
Childs Armoir

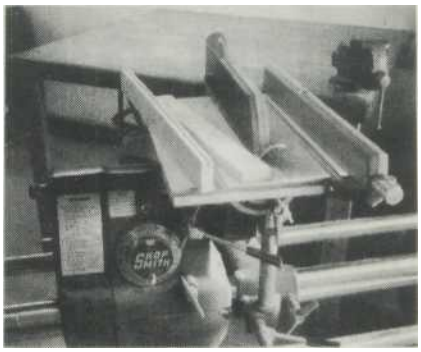


THIS CHILD'S ARMOIRE will make it easy for kids to keep their rooms neat and orderly. Its six drawers and two shelves provide enough storage space to house a substantial wardrobe. By following a simple modification to be described below, the shelf compartment can even be replaced with a small closet complete with clothes pole for hanging dresses, suits, or coats. Best of all, the ar-moire is designed especially with the pint-sized set in mind. No more standing on tippy toes just to reach a clean pair of socks!

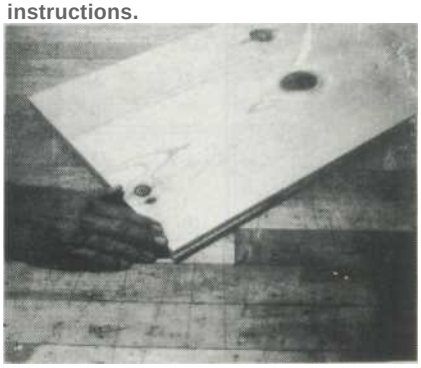
Before starting on the project, carefully study all photos, diagrams, lists, and building instructions. One attractive feature worth noting at the outset is that no fancy joinery is required. With the exception of a few simple rabbets, nothing more complicated than butt joints is called for. On all of these joints, use 1 1/4" finish nails and glue unless otherwise specified. Another plus is that only the most basic of shop tools are needed, although a router is essential, and you 11 probably also find a table saw to be helpful.

Because of the variety of dimensions encountered in the plan, we've simply indicated the total amount of 3/4" pine required, which is 47 board feet. This figure allows approximately 15% for scrap. When shopping at the lumberyard, bear in mind that the largest single width of pine called for in the plan is 6 3/8" (parts V and W).

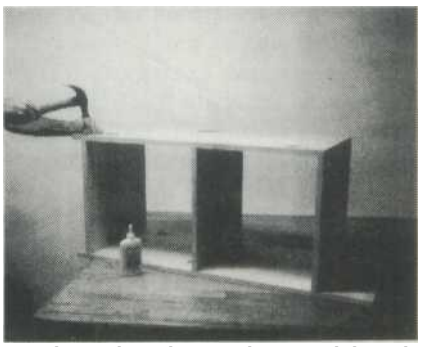
Procuring the hardware should not be much of a problem. If you do have difficulty, though, a complete



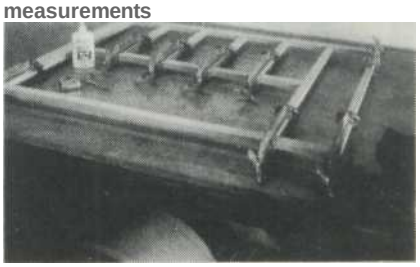
The first step is to cut all wood to proper size. Refer to the cutting schedule and Details 1 and 2 for further instructions.



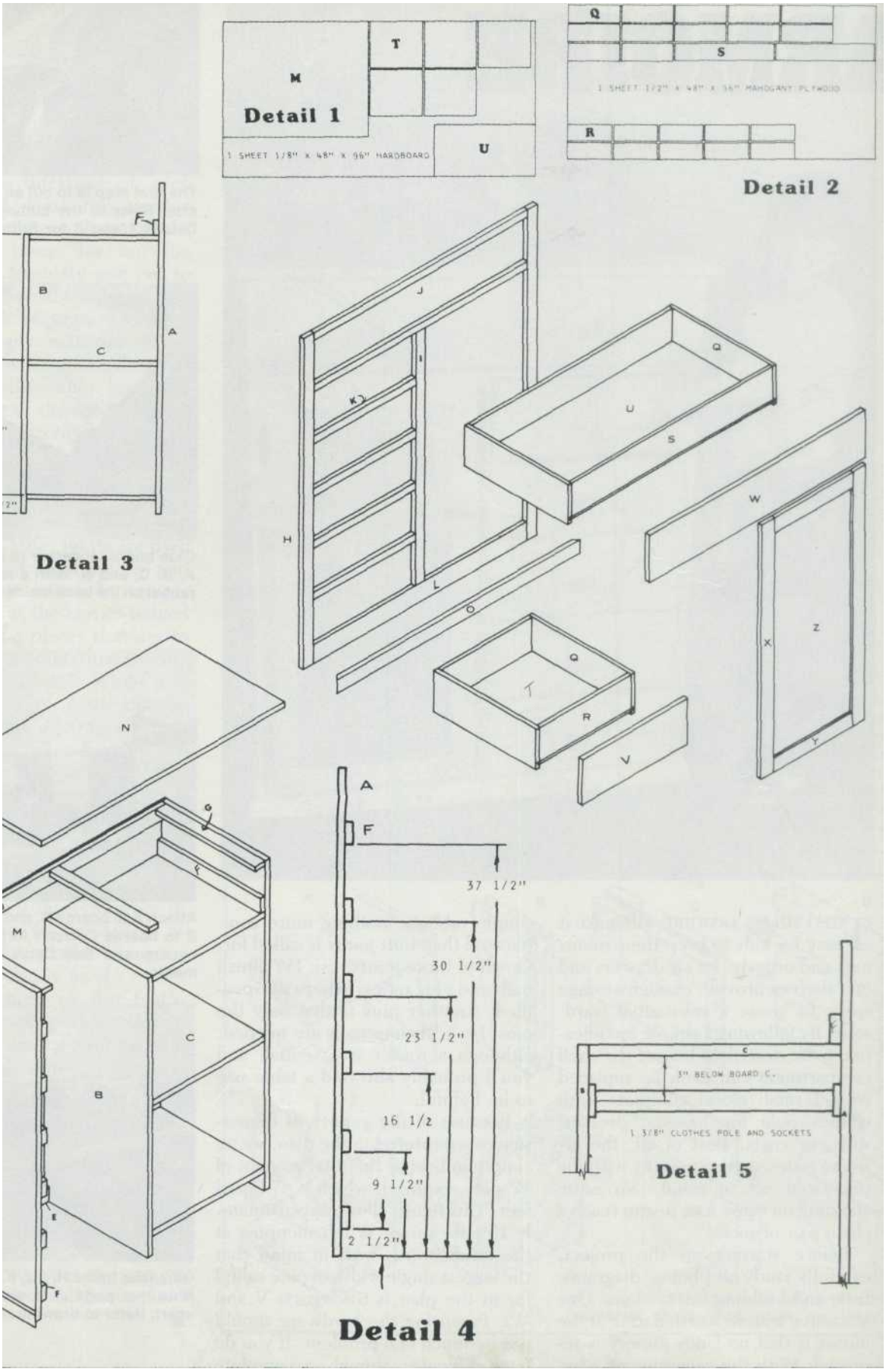
Glue boards together to make up boards A, B, C, and N. With a router, cut a thin rabbet on the back inside edge of board A.



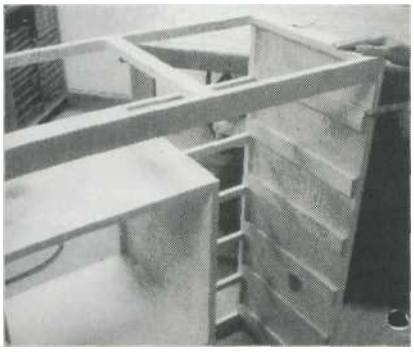
Attach A to boards B, and C. Attach board B to boards C. Don't forget to check for squareness. See Detail 3 for measurements



Glue face frame H, I, J, K, and L together. Note that parts J, K, and L are each 6" apart. Refer to drawing on the next page.

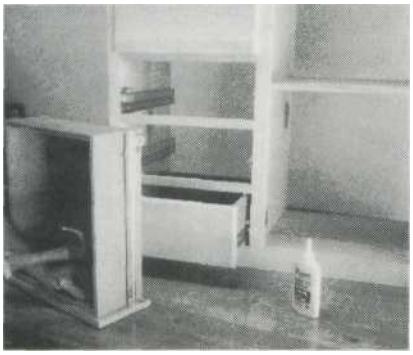

M
T
U
1 SHEET 1/8" x 48" x 96" HARDBOARD
Detail 1
Q
S
R
1 SHEET 1/2" x 48" x 96" MAHOGANY PLYWOOD
Detail 2
F
B
C
A
Detail 3
J
I
K
H
L
O
Q
U
S
W
X
Z
Y
T
R
V
N
G
M
C
B
E
F
A
F
37 1/2"
30 1/2"
23 1/2"
16 1/2
9 1/2"
2 1/2"
Detail 4
C
3" BELOW BOARD C.
1 3/8" CLOTHES POLE AND SOCKETS
Detail 5

Attach face frame to A, B.and C. Attach upper back crosspiece D to boards A. Attach lower crosspiece E to A and B.



Attach two boards G to A, D, and J. Attach one board G to the center of D and J. Then attach drawer supports F to both boards A.

Nail Q to R using 1" brads. Slide hard-board T into groove in Q and nail. Follow the same procedure for the large drawer.



Attach drawer guides to boards Q and F. Nail the drawer fronts R and S to the drawer face panels using brads and glue.

set of hardware, replete with mounting instructions and all necessary screws, can he ordered through the mail. Write to the address found at the end of this article for more information.

Cutting the Parts. Begin by cutting all parts down to their proper sizes as indicated on the cutting schedule. Consult the panel layouts in Details 1 and 2 before cutting out parts M, Q, R, S, T, and U. Farts A, B, C, and N are formed by gluing smaller hoards together. This not only saves you the trouble of hunting down unusually large widths of lumber, but is also an excellent strategy for avoiding possible warpage. Of course, whenever you build up large boards from smaller ones in this way, it's a good idea to use dowels for extra strength. When cutting out the parts, note that only two shelves (C) are needed if you intend to make the cabinet space into a closet.

With a router, cut a rabbet into the back inside edge of each part A side piece; this is to allow for the eventual placement of the rear hard-board panel (M). Similarly, cut grooves into the lower inside edge of each of the drawer sides (Q) to provide access for the hardboard drawer bottoms (T and U). In the interests of safety, you'll also want to round off all of the exposed edges of the piece with a router. The upper edges of the top piece (N), for example, should be rounded off to a 1/4" radius, as should the outside edges of the drawers (parts V and W) and cabinet door (parts X and Y).

Construction. Start by building the cabinet compartment with parts B, C, and one part A. Refer to the accompanying photos and to Detail 3 for the proper placement of parts. If you intend to make a closet out of the shelf space, ignore the middle shelf board (C) shown in Detail 3. Check for squareness and accurate alignment of all parts. Next, assemble the face frame from parts II, I, J, *K,* glue here, and drive the nails through part II (on the drawer side of the face frame) into the front edge of the side panel. To secure the construction, attach the upper back crosspiece (D) between the two parts A, following the placement indicated on the schematic. This crosspiece must be aligned with the rabbets on the two parts A in order to accommodate the rear hardboard panel (M). The lower back crosspiece (E), spanning from part B to the drawer-side part A, is similarly aligned with the rabbet on A.

On each side of the unit now, attach a top support (G) between the face frame and the upper rear cross-piece (D), as shown in the schematic and Detail 3. Then take the remaining part G top support and fasten it to parts D and J in the center of the unit. The drawer supports (F) are added next. Detail 3 shows how one part F is to be situated on the cabinet-side part A. The remaining six drawer supports are arranged on the drawer-side part A according to the measurements given on Detail 4. Once all the drawer supports are in place, carefully center the armoire top (N) and fasten it to parts D, G, and J. Set the unit aside now, and allow all glue to dry.

Drawers. Each of the five small drawers consists of two sides (Q), a front and back (both parts R), a hard-board bottom (T), and a face panel (V). Start by attaching the front and back to the sides with 1" brads and glue. As seen in the schematic, the tops of the two parts R are flush with the tops of the drawer sides. Next, slide the hardboard bottom (T) into the grooves of parts Q, and secure it with a nail or two. Repeat this procedure in assembling the large drawer from parts S, U, and the remaining parts Q.

Following the manufacturer's instructions, attach the 16" drawer guides now to the drawer supports (F) within the armoire unit and to the sides (Q) of each drawer. Assembly of the drawers is completed then with the addition of the face panels (parts V for the- small drawers; W for the large drawer). Use glue here, and drive 1" brads through the drawer fronts (R or S) into the face panels. Again using 1" brads, fasten the hardboard rear panel (M) to the back of the armoire, driving the brads through M into parts A,

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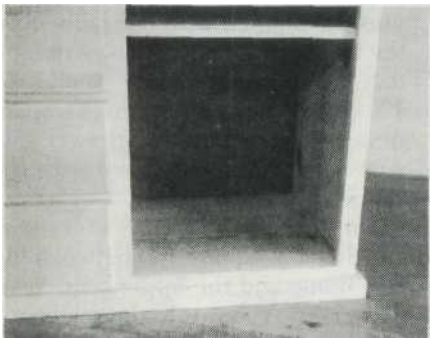

Use 1" brads to attach M to A, D, and E. Miter front ends of boards P and attach to A. Miter both ends of O and attach to L.

attached next. First, miter both ends of the front base piece (O) at a 45° angle, and miter the matching end of each of the two side base pieces (P). Parts P are then glued and nailed to parts A, while O is fastened to the face frame bottom (L).

Cabinet. The cabinet door comprises parts X, Y, and Z. Start by routing out a 1/8"'-wide x 3/8"-deep channel centered along the inside edges of parts X and Y. The cabinet door panel (Z) is nestled within these channels and secured in place with glue. The excess channel space on both ends of each part X may be concealed with a wood filler. Otherwise, **cut** four 1/8″ x 3/8" x 1 1/2" splines from scrap and glue into place. Hang the door with hinges mounted 4" in from each end. Attach wooden knobs to the drawers and cabinet door, sand the entire unit and finish as desired.

Assuming you've left out the middle shelf (C), it's an easy matter **to** make the cabinet compartment into a closet for hanging clothes. All that's needed is a pair of 1 3/8" diameter clothes pole sockets and a 17" length of l 3/8" dowel. Just locate the sockets 3" below the cabinet ceiling (C), and centered on parts A and B. Detail 5 shows the arrangement found in the closet option.

and L, as shown in the schematic. The horizontal parts J, K, and L are spaced 6" apart in the frame to make room for the drawers. Clamp the completed face frame securely, and allow all glue to dry before continuing.

The face frame assembly is then carefully positioned on the cabinet compartment and fastened into place. Now attach the remaining side panel (A) to the construction. Use

B, D, and E. The front and side base pieces are

MATERIALS LIST

Qty.	Size	Material	Items
1	⅛" × 48" × 96"	Hardboard	M,T,U
1	½" × 48" × 96"	Mahogany plywood	Q,R,S
1	⅛" × 13" × 31"	Pine or birch plywood	Z
47	Board feet, ¾"	Pine	A,B,C,D,E,F,G, H,I,J,K,L, ,N,O,P,V,W,X,Y

CUTTING SCHEDULE

All measurements are in inches. All material is pine unless otherwise indicated.

Item	Qty.	Size	Description
A	2	¾ × 16¼ × 44½	Sides
B	1	¾ × 16⅛ × 37½	Vertical divider
C	3	¾ × 16⅛ × 17¼	Shelves
D	1	¾ × 2 × 34½	Upper back crosspiece
E	1	¾ × 2 × 16½	Lower back crosspiece
F	7	¾ × 2 × 16⅛	Drawer supports
G	3	¾ × 1½ × 15⅜	Top supports
H	2	¾ × 1½ × 44½	Face frame sides
I	1	¾ × 1½ × 34	Face frame vertical divider
J	2	¾ × 1 × 33	Face frame top drawer guides
K	4	¾ × 1 × 15¾	Face frame drawer guides
L	1	¾ × 2½ × 33	Face frame bottom
M	1	⅛ × 35¼ × 44½ (hardboard)	Rear panel
N	1	¾ × 17¾ × 37½	Armoire top
O	1	¾ × 1⅝ × 37½	Front base piece
P	2	¾ × 1⅝ × 17¾	Side base pieces
Q	12	½ × 5⅝ × 16 (mahogany ply.)	Drawer sides
R	10	½ × 5¼ × 13¾ (mahogany ply.)	Small drawer fronts and backs
S	2	½ × 5¼ × 31 (mahogany ply.)	Top drawer front and back
T	5	⅛ × 14¼ × 16 (hardboard)	Small drawer bottoms
U	1	⅛ × 16 × 31½ (hardboard)	Top drawer bottom
V	5	¾ × 16⅜ × 16¼	Small drawer face panels
W	1	¾ × 6⅜ × 33½	Top drawer face panel
X	2	¾ × 2 × 34⅜	Cabinet door frame verticals
Y	2	¾ × 2 × 12¼	Cabinet door frame horizontal
Z	1	⅛ × 12¾ × 30⅞ (ply.)	Cabinet door panel

Hardware:
6 pair 16" drawer guides
8 1½" diameter wooden knobs
1 pair door hinges
1 small box 1" brads
1 small box 1¼" finish nails
1 bottle yellow carpenter's glue
1 quart finish

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China Hunt

ARE YOU LOOKING for a showpiece china hutch to display your elegant chinaware, antique vase, or collectibles? Here's the perfect cabinet for you, with lots of transparent glass to show off your treasures. It even has an elegantly wallpapered hacking that can be changed at will. Select the decorative hardware to match the decor of your room—bright, brassy and modern or dark and intricate Mediterranean, or even sleek Oriental. You'll find a wide variety of handles and drawer pulls in all styles at any good hardware shop.

Choose flat defect-free boards in the wood of your choice tor the frame. Rip them on the table saw into strips 13/4" wide. Remove all saw marks with a plane or jointer. Do notremove too much stock, just enough to clean the edges, Cut the strips to the various lengths. For the front, you will need three strips cut to 28 1/2". These are tor the crosspieces. You will also need one piece 5 3/4" x 28 1/2" to be used for the lower section.

Drill dowel holes as indicated; the use of a doweling jig and dowel centers is recommended. Mark of! the hole locations and drill into the ends of the crosspieces. Make the holes 3/8" in diameter and 1 1/16" deep. Because of the narrow width (1 3/4") use only one dowel per joint. The jig will automatically center the hole. After drilling the crosspieces, use dowel centers to transfer the hole locations to the uprights. Use two dowels for the wide bottom piece.

Before assembling the parts to make up the frame section, prepare the clamps by opening them up to size; also have some scrap strips of wood at hand for protecting the work surface from the clamp jaws. Bar clamps are ideal for this operation. Dab some glue on the dowels, insert into the drilled holes, then coat the mating surfaces with glue and join. Use adequate pressure on the clamps to force glue from the joint, but do not overtighten. Check the frame to be certain that it is square, then set aside while the glue dries.

Prepare the side crosspieces and the rear uprights. These are drilled and assembled much like the front frame, the only difference being that the depth of the dowel holes differs. The holes are drilled 1 1/2″ deep into the 9 1/4" crosspieces and 1/2″ deep into the uprights.

After drilling the necessary holes into the rear uprights, rabbet the edge to take the rear panel. Because the uprights are only 3/4" X 3/4" in cross section, a double pass on the table saw **is** recommended rather than using the router.

The side frames are assembled by gluing the crosspieces to the rear uprights. These are then glued to the front frame. Again, use the dowel centers to locate the holes for the dowels from the crosspieces to the front frame.

The frame at this stage will be somewhat flimsy, so handle with care. The addition of the shelves is the next step. This will make the frame rigid and strong. Cut the frames to size, then drill diagonal holes through the bottom of the three lower shelves. The top piece is drilled from the top side. Use 1 1/2" round head (RH) screws to attach the shelves.

The frames for the doors and side panels are made next. Cut the necessary pieces and assemble them with 3" finishing nails. Pilot holes for the nails must be drilled to simplify nailing and to prevent splitting. Note: Space the nails so they won't be cut with the router later on when making the rabbets for the glass.

The side panels will be held in place with screws which must not show in the finished cabinet. This is accomplished by drilling screw holes in the rabbeted area where the glass molding will conceal them. Drill the holes before assembling the panels.

When all the panels are assembled, rabbet them lor the glass and cut the decorative bead using the router. Sand all edges and surfaces, then install into the frame. The nose and cove molding is added using glue and spring clamps to hold them in place. Miter all corners and use care not to mar the molding surface. A piece of felt glued under the clamp jaws is recommended.

Door panels are made with sufficient allowance for the strip hinges. The left-hand doors have a door stop added. The right-hand doors are beveled at the left edge to clear the other door. When installing the strip hinges, use only the end holes until you have cheeked fit. If fit is okay, you can then add the balance of the screws.

The bottom door which opens horizontally is treated in the same manner. Instead of glass, it has a 1/4″ back panel. In addition, it has an insert to improve its appearance. This insert is simply a piece of 3/8" solid lumber which drops into the panel opening.

Add the plywood inserts to the bottom panels of the side pieces. These are glued into place.

Next add the decorative strips around the top of the cabinet. This is made by rabbeting a long strip of 1 1/4" stock which is then cut apart and mitered. Hold it in place with **screws** and glue.

The rear panel of 1/4″ plywood is *not* nailed to the cabinet. Instead it is screwed so that it can be removed as desired to change the decorative paper background. Use round head serews.

Drill the holes for the various pieces of hardware. Mount and check fit. Remove hardware when applying finish, then replace.

Finish the cabinet as desired. You can stain the wood and top with several coats of varnish for an antique look.

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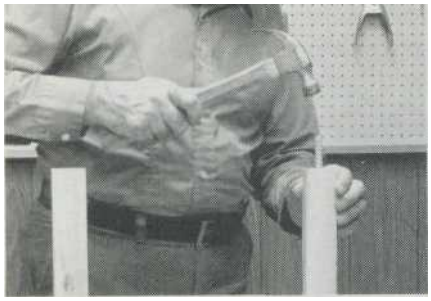
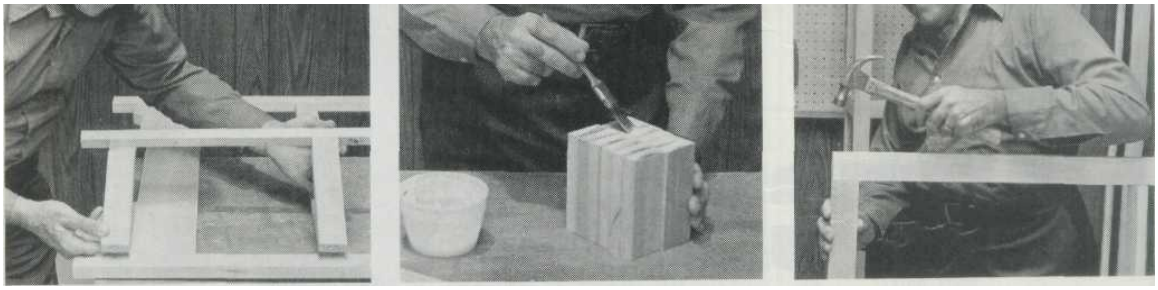


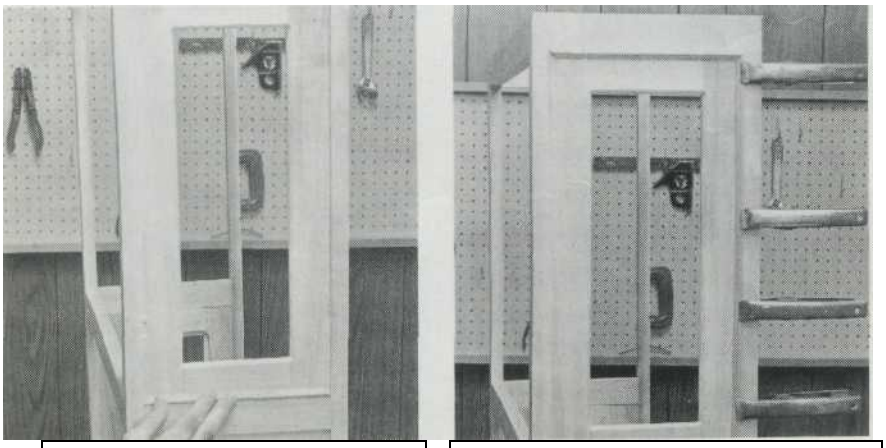
The frame sections of the china hutch are assembled with the aid of glue and spiral dowels. Dowel centers are recommended to



This photo more clearly shows how locating pins are used to transfer the dowel holes from the edge to front of frame. Use bar clamps till glue dries

Shown here is how the end grain of the crosspieces are given a sizing coat of glue. Sized glue is made by mixing equal measurements of

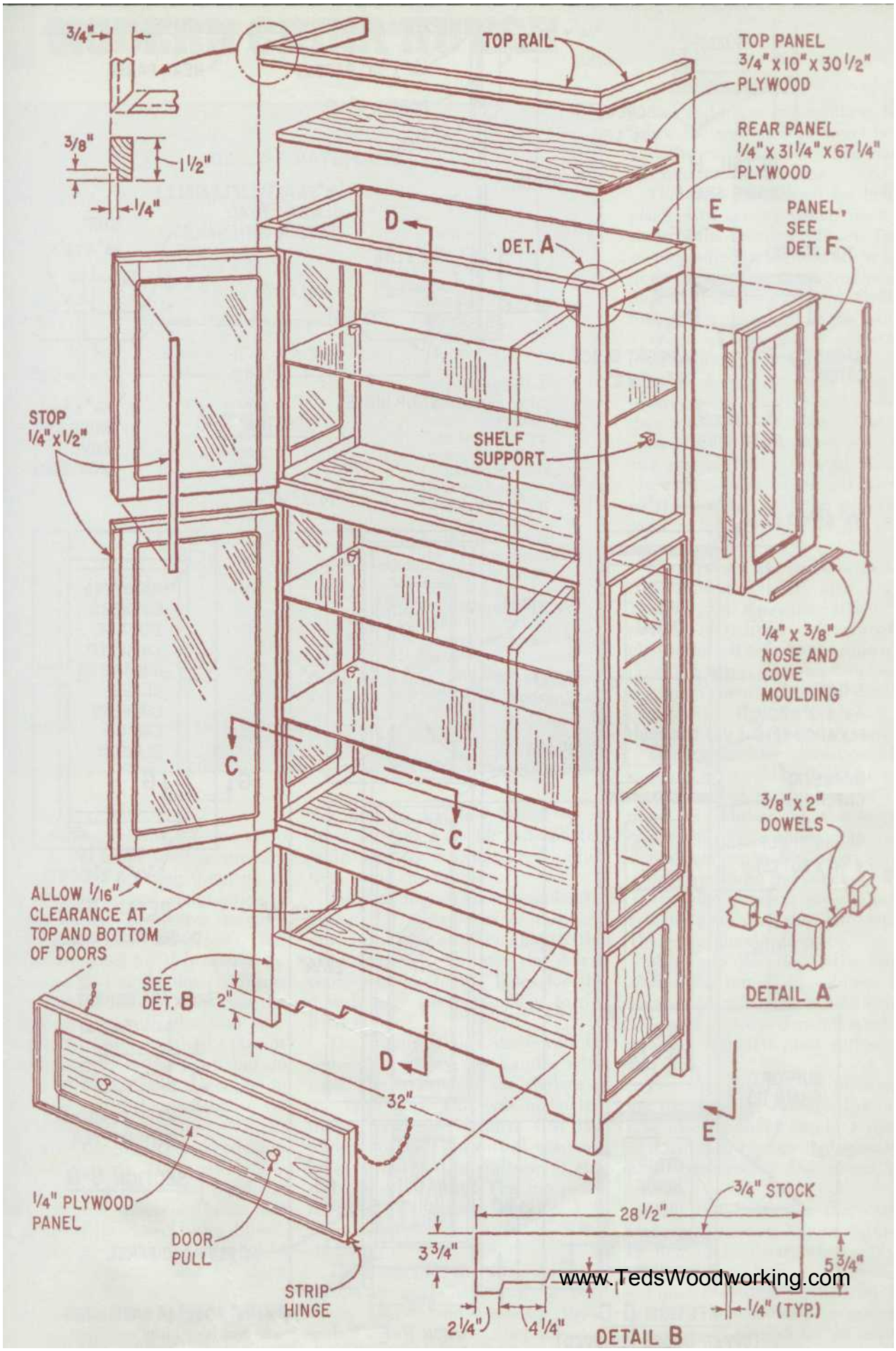
The upper, center, and lower panels are assembled with glue and nails. Pilot holes are drilled before nailing to prevent the thin wood from



The edges of the panels are dressed up with the application of nose and cove molding. This molding can be bought at lumber yards, home decorating centers.

You won't need to use nails to apply the molding if you follow the technique shown here. The molding is simply glued into place, held by clamps until dry

The inside edges of the panels must be rabbeted to accept the glass; they are re-moveable so that glass can easily be replaced in the event they are broken.



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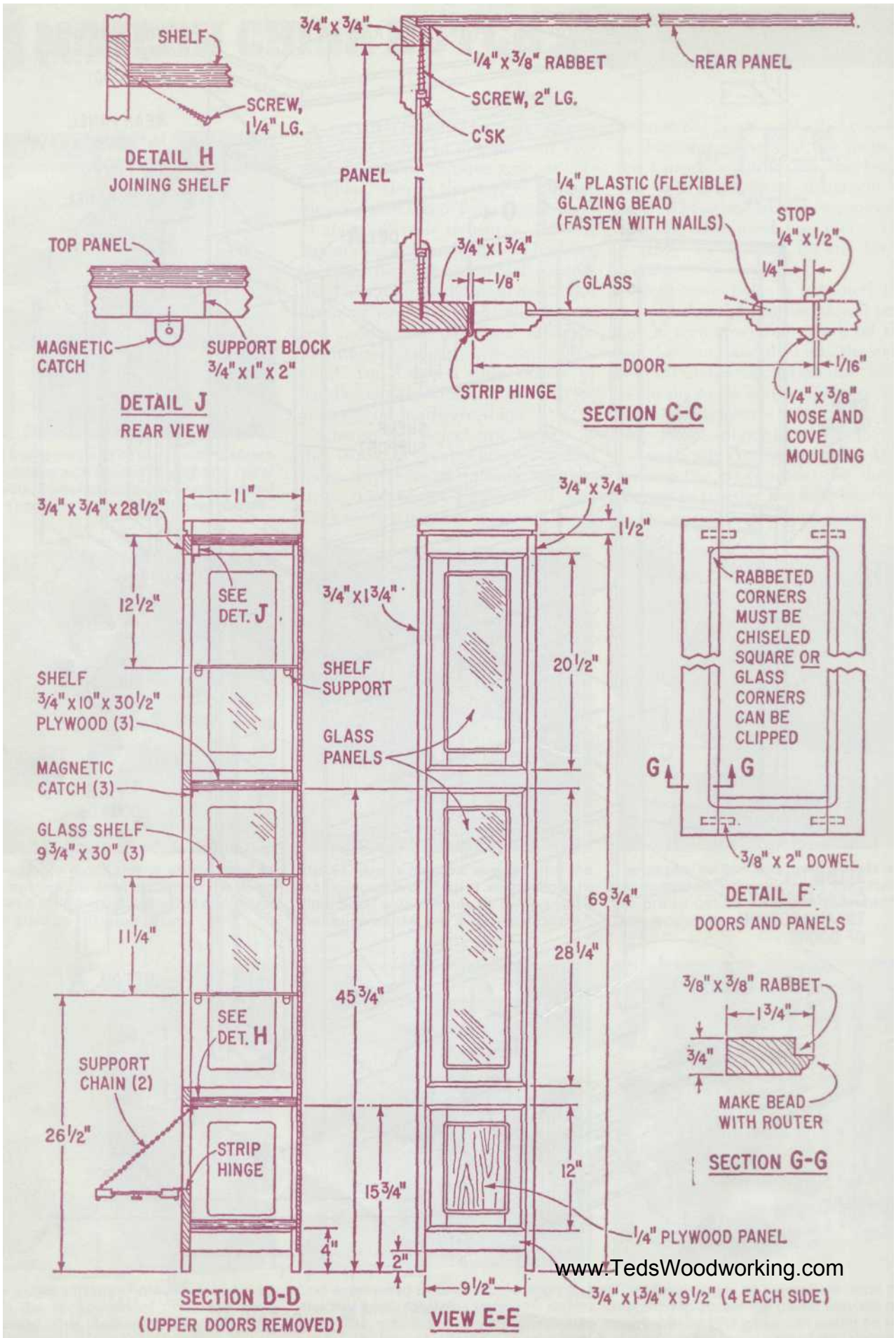

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Shaker-Style Woodbox

Given the resurgence of fireplaces and wood-burning stoves over the last couple of decades, needs for in-home firewood storage also have redeveloped. Unlike earlier times, when many households depended upon wood-fueled fires for all of their cooking and heating, storage requirements today are somewhat reduced. This became readily apparent as I looked through my library for design ideas to construct a woodbox. place. While the room's overall ambiance is southwestern, it also contains a few other early-American antique pieces. A durable, functional woodbox was needed that, rather than providing a focal point for the room's decor, would serve its purpose without detracting from the ambiance.

Because the box was to be painted, I built it of clear white pine. Also, since the box was to be simple but functional, the joinery was selected on the basis of durabil-ity and efficiency. This box is easy to make, but it is still high quality To ensure that the box would hang together as chunks of firewood are thrown in, and as the wood shrinks and swells with the changing sea-sons, the joinery, the grain orienta-tions and the seasonal movements of its components all had to be carefully considered.

As indicated in the drawings, dadoes and rabbets were used to join this box, securing the joints with cut nails. Cut nails are my choice over wire nails because they have more holding power and are historically correct for this style of joinery. I oriented the grain so the ends and bottom expand and contract in unison; that is, the cross-grain dimension extends front to back in these components. Thus, the front and back panels are carried along as the end and bottom shrink and swell.

The cross-grain orientation in the front, back and partition is vertical so these three components move as a unit as well. However, the partition is not carried with the bottom; therefore, the partition is housed in dadoes at each end and its length is adjusted so the bottom (along with the front and back pan- els) will move independently throughout the year.

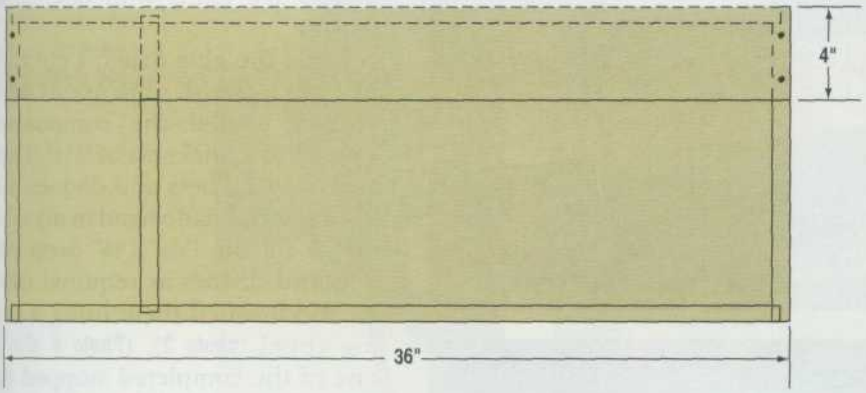
Finally, the rabbets in the end panels are stopped at the bottoms of the front and back panels. With the bottom housed in dadoes in the ends and in rabbets in the front and back, the bottoms of the front and back should be fixed, forcing expansion and contraction of these components to operate along their tops.

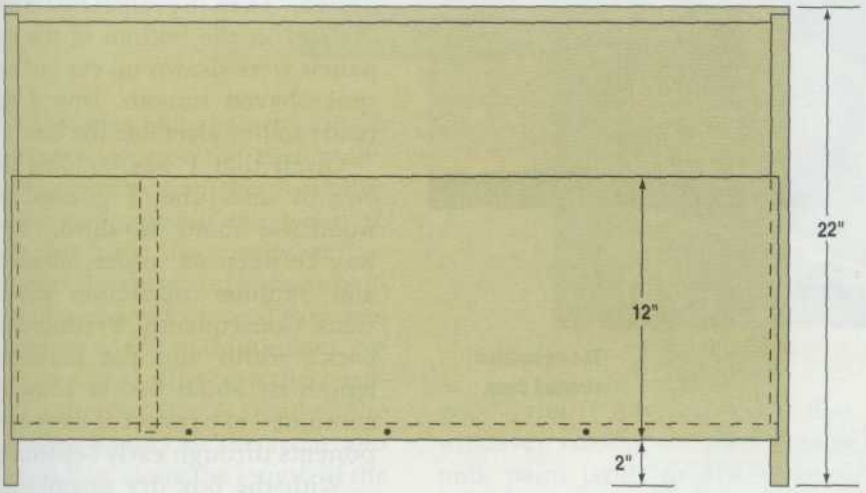
Since the back is housed in the top of the rabbet, the gap between the back and top from late-winter to mid-summer will be visible only from the back. However, the front will shrink to expose an 1/8″ or so of the rabbets in each end, while in late summer the front's top edge will extend above the relief in the ends

If this is objectionable, one could use a housed rabbet and dado joint, stopping the dado below the relief. This is a more complicated joint, however, requiring a bit more time which translates, in the commercial world, to additional cost.

With these design and construction details thought through, I proceeded to select and square-up stock for this box, not overly concerning myself with grain and color matching since the box was going to be painted. I also did not discard stock because of blue stain as I glued-up stock to the panel dimensions given in the cutting list. To make the wider panels, I simply edge-joined the stock, liberally spreading yellow glue on the edges, and clamped the stock together. Since one of my most important goals is to build furniture that does not self-destruct a decade

Dimensions



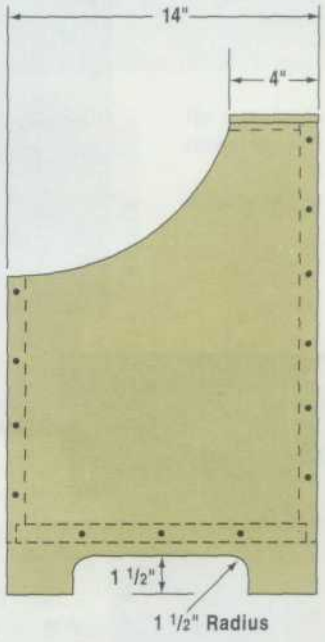


Materials List

White Pine:

2 ends	13/16" × 14" × 21 9/16"
1 front	13/16" × 12" × 35 1/8"
1 back	13/16" × 19 9/16" × 35 1/8"
1 top	13/16" × 4" × 36"
1 partition	3/4" × 11 9/16" × 13 1/8"
1 bottom	13/16" × 13 1/8" × 35 1/8"

2d cut finish nails
1 pint milk paint



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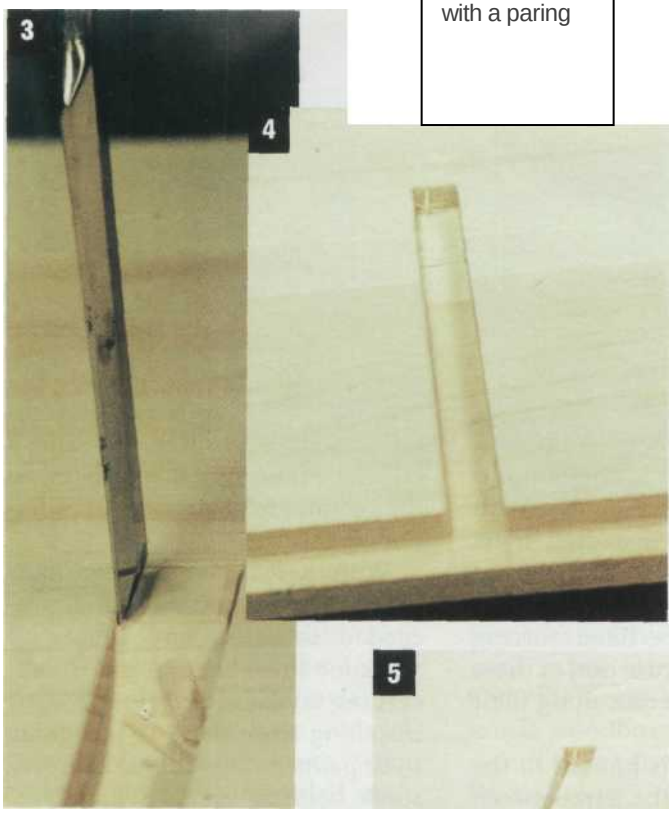
Cutting glued-up ends to finish dimensions

Cutting the rabbet in the bottom edge of the back panel

Completing a stopped dado with a paring



The completed stopped dado.

or two hence, I did not "reinforce" these edge joints with biscuits or dowels.

Once the glue dried, I cut each piece to its finish dimensions (photo 1) and planed the components smooth to a thickness of 13/16″. Then I laid out rabbets and dadoes. Using a stacked dado head in my table saw, I cut the 13/16"X3/8" deep rabbets and dadoes as required (photo 2), and finished them using a paring chisel **(photo 3). (Photo 4** shows one of the completed stopped dadoes.) I also cleaned up the rabbets with a shoulder plane so the assembled joints would be tight and crisp **(photo 5).** Then the reliefs that create the feet in the bottom of the end panels were drawn in, cut out and spokeshaved smooth. Now I was ready to dry assemble the box.

Given that I was building this box in mid-June, I guessed my wood was about two-thirds of the way between its winter minimum and summer maximum dimensions. Consequently, I reduced the back's width and the partition's length by about 3/32" to allow for continued expansion of these components through early September

With the box dry assembled, I laid out the curved relief in the top front of the end panels. By drawing the curves full-size on the ends, I could play with the shape until I found one that was pleasing to the eye. Disassembling the box, I cut the reliefs in each end, spokeshaved them smooth, and sanded the inside surfaces to 180 grit. The box was now ready for final assembly.

As before, I assembled the box dry and clamped it together securely. No glue was used in the box's assembly to ensure that slight differences in expansion would not cause the components to pull themselves apart. Using a 1/16" drill bit, I provided pilot holes for the nails and proceeded to nail through the ends into the front, back and bottom panels. In using cut nails, which have a

Cleaning up a rabbet joint with a shoulder plane

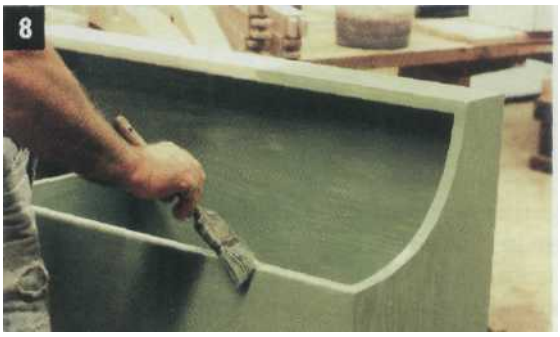
rectangular cross-section shape, the wide dimension must be oriented along the grain **(photo 6);** thus the wedge effect of the wider than thick nails is exerted against the end grain, thereby eliminating the possibility of the nail causing the wood to split. Similarly, the bottom was secured to the front and back by nailing through the front and back into the edges of the bottom panel. No nails are used to secure the partition, since the idea is to allow the partition dadoes in the front and back to float along the length of the partition as the bottom/ends unit expands and contracts. Finally, I nailed the top to the ends, then countersunk all nail heads 1/16" to 1/8" below the surface. The cavities were filled, and after the filler cured, all exterior surfaces were sanded to 180 grit. **(Photo 7** shows the assembled box.) While 180 grit abrasives leave far too coarse a surface for my taste, this box was to be painted with tavern green milk paint. Since milk paint provides a textured mat surface, sanding beyond 180 grit would have been a wasted effort.

Driving a cut nail, showing the wide dimension of the nail, is oriented along the grain of the wood you're nailing through

Following the manufacturer's directions, I mixed a pint of tavern green milk paint and coated the box inside and out. Now I have painted a fair number of Windsor chairs with milk paint since I began building chairs in 1984, but despite this decade of experience, my reaction as the first coat of milk paint dries is almost always the same — good grief, I have ruined it! For whatever reason, the first coat of milk paint tends to dry off-color and blotchy, in a word, awful! **(photo 8)** Anyhow, I persevered and burnished the dry painted surface with #2 steel wool. Then I applied the second coat and, voila, things were looking up. Once the paint was dry, I again burnished the surface, this time with #0000 steel wool. Now the box looked like something I could sign.

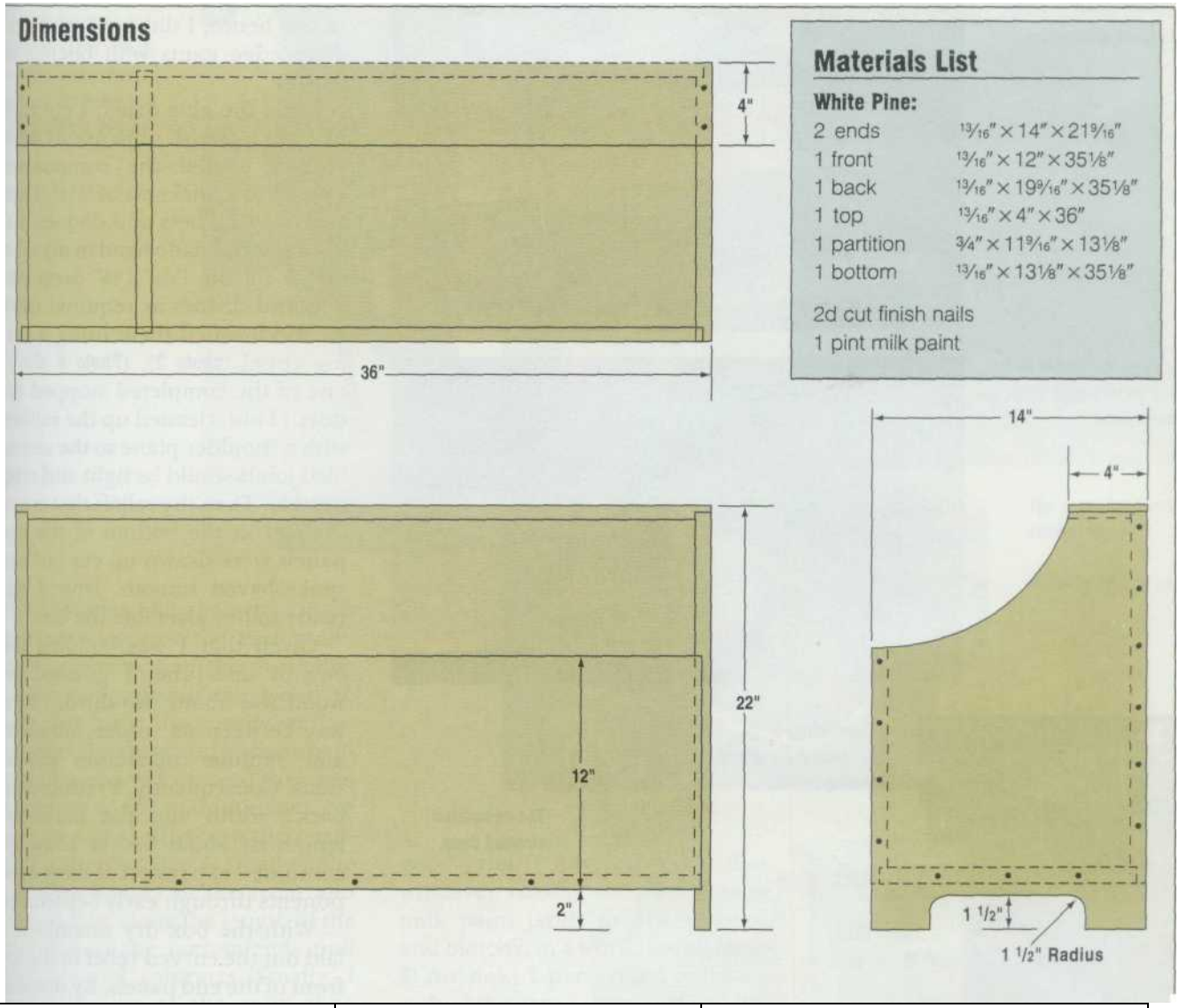
The assembled and sanded woodbox.

While the milk paint provides a



Appling milk pain

very durable and quite refractory finish, it does water spot badly. To minimize this, I always seal milk painted surfaces with an oil finish of some sort —tung oil, Watco Danish oil or, for this piece, a mix of equal parts of boiled linseed oil, turpentine and satin polyurethane varnish. I coated the box with this mix, let it stand for 10 or 15 minutes, then wiped off the excess with paper towels, taking great care to collect all the oily paper afterward and destroy them in my wood-burning stove to avoid having them



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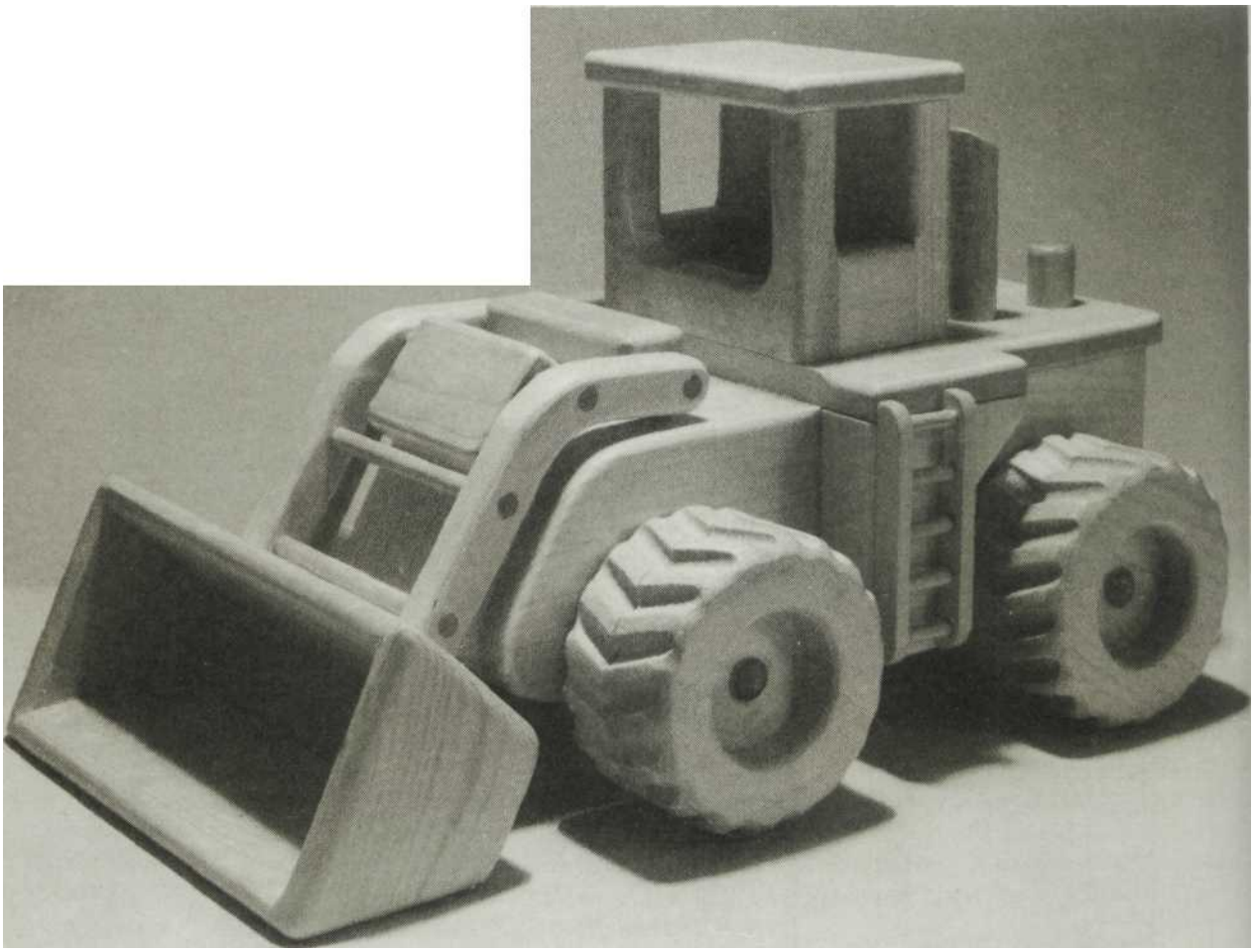
EARTH MOVER



This earth mover features a moveable shovel that stops in different positions. This project should successfully accommodate most of your child's heavy earth moving needs for quite sometime. It is pictured here built in clear pine but it can built in a wide variety of woods. Soft maple would be an excellent alternate choice.

Begin construction with the body. Rip an 18" length of 3/4" stock 4-1/2" wide then set the saw for a 30 degree bevel. Make a crosscut to produce the mitered ends . Cut from the remainder then make a series of 1/8" deep kerf cuts spaced 1/8" apart to detail the radiator grille.

Cut the side pieces to size then bore the axle holes before assembly. Use a belt sander or hand plane (or both to form the front end curves.

Cut the cab and remaining body parts to size then use the router with a 5/32" corner rounding bit to ease all sharp corners before completing the body assembly.

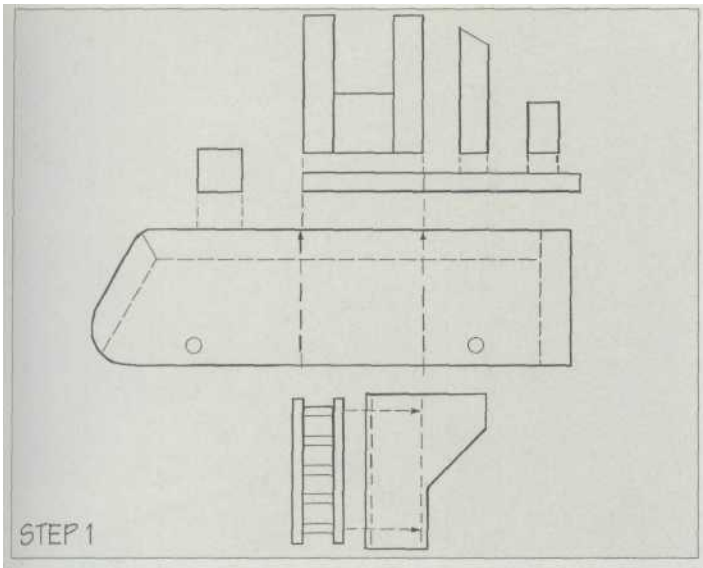
Construct the bucket and bucket arm assembly. Mark the location of the arm ends and use a chisel to cut the 1/4" deep mortises to receive them. If you have a brad point or Forstner bit that bores a flat bottomed hole, use it first then square the corners with the chisel. The bucket pivot is nailed and glued to the body after the entire bucket assembly has been completed.

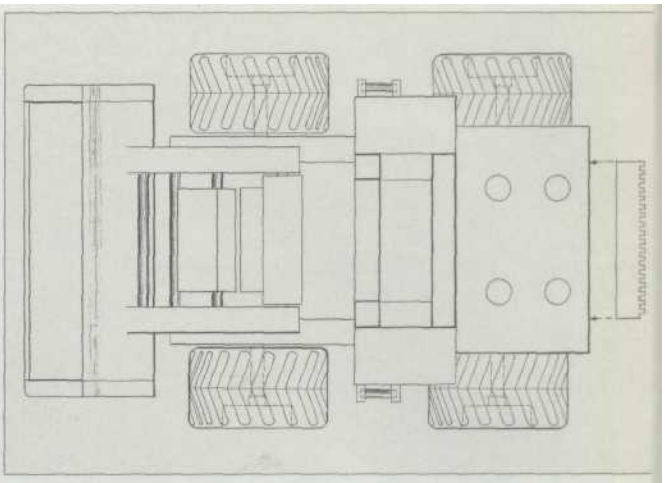
The fat wheels are made up by joining two discs of 1-1/8" stock after angled holes are bored to form the knobby treads. The simple jig used to bore the holes features a hardwood guide block which has two holes drilled at 20 degrees angles in **opposite** directions. Note that these holes must align with the pivot hole so they are bored from the bottom of the block before the jig is assembled.

The jig may be used with a portable drill or on a drill press. If using a drill press tilt the table or prop the jig so the bit enters the angled guide holes squarely. Bore the holes in discs #1 & #2 as indicated. To save layout time make photocopies of the wheel diagram and attach to each disc with rubber cement.

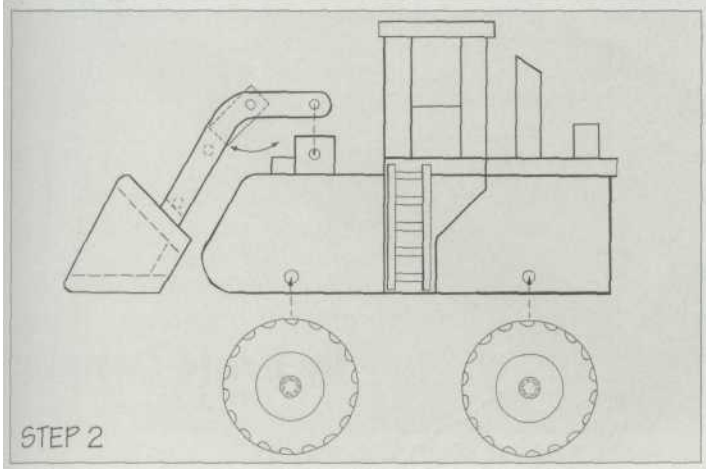
Use a 2" dia. Forstner bit to bore the recess in the outer disc, Part 1, then Counterbore for the plug and axle. Saw the discs to final size after the angled holes are bored to reveal the treads. Use the router to round over the corners. Sand then glue the wheels to the axles in place on the body.

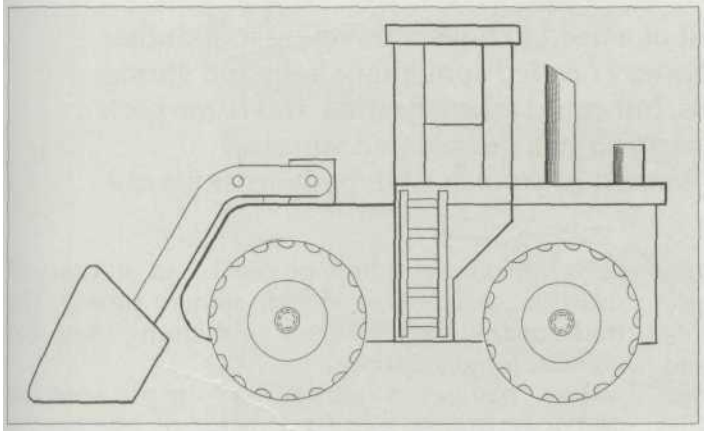
Finish with several thin coats of shellac or two coats of polyurethane finish.



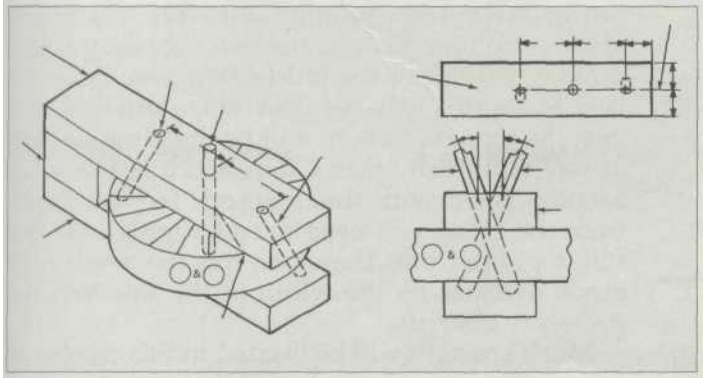


PLAN VIEW OF COMPLETED PIECE





STEP 3 COMPLETED PIECE



JIG FOR CREATING TIRE TREADS

BRUT EARTH MOVER MATERIAL LIST

QTY.	DESCRIPTION	
4	1-1/8″ x 5″ dia.	(outer wheel)
4	1-1/8″ x 5″ dia.	(inner wheel)
2	3/8″ dia. x 8-1/2″ dowel	(axle)
4	5/8″ dia. wood buttons	(hub cap)
1	3/4″ x 3-5/16″ x 4-1/2″	(body front)
1	3/4″ x 4-1/2″ x 1O″	(body top)
1	3/4″ x 3-1/2″ x 4-1/2″	(radiator)
2	3/4″ x 3-1/2″ x 12″	(body side)
2	1-1/8″ x 3″ x 3-1/2″	(body)
1	1/2″ x 3″ x 3-1/2″	(cab deck)
1	1/2″ x 3-7/8″ x 6-1/2″	(engine hood)
1	3/4″ x 3-1/2″ x 5″	(cab front)
1	3/4″ x 3-1/2″ x 5″	(cab rear)
2	3/4″ x 1-1/2″ x 1-1/2″	(cab side)
1	1/2″ x 3-3/8″ x 5-1/4″	(cab roof)
2	3/4″ dia. x 3-1/2″ dowel	(exhaust)
2	3/4″ dia. x 1-1/2″ dowel	(exhaust)
2	1/2″ x 2-3/4″ x 4″	(bucket end)
1	1/2″ x 3″ x 8″	(bucket rear)
1	1/2″ x 1-1/4″ x 8″	(bucket bottom)
1	1/2″ x 3-1/2″ x 8	(bucket front)
2	3/4″ x 2-1/4″ x 6-1/4″	(bucket arm)
1	3/4″ x 1-3/4″ x 3″	(bucket lift)
1	1/2″ x 5/8″ x 3″	(bucket stop)
1	1-1/8″ x 1-1/8″ x 3-3/4″	(bucket pivot)
4	5/16″ dia. x 5-3/8″ dowel	(arm support)
4	1/4″ x 1/2″ x 3-3/4″	(ladder rail)
10	1/4″ dia. x 1″ dowel	(ladder rung)
4	7/16″ I.D. x 1″ O.D.	(flat washer)

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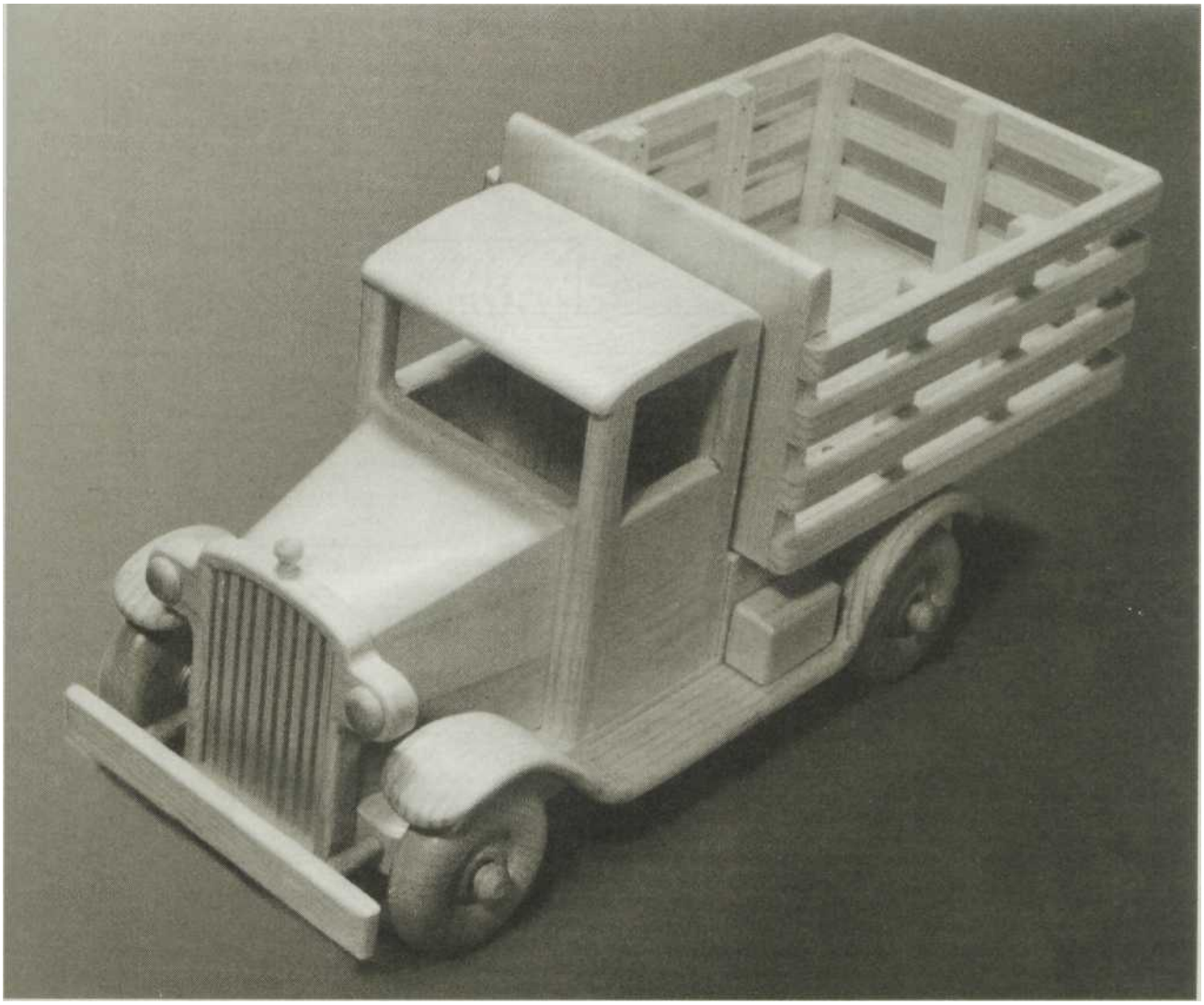
STAKE TRUCK



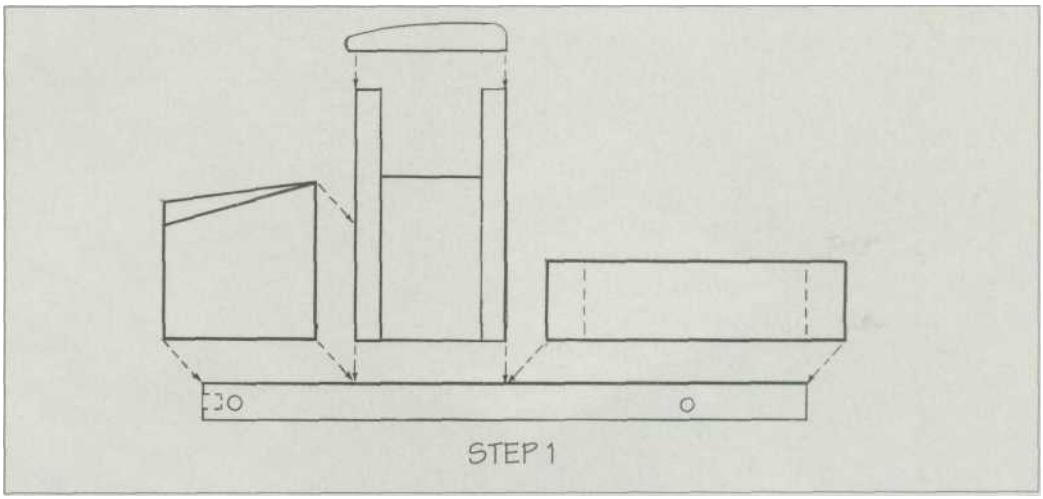
Here is a neat easy to build toy truck that your child will treasure. This truck is made of clear pine but you may opt for a different stock.

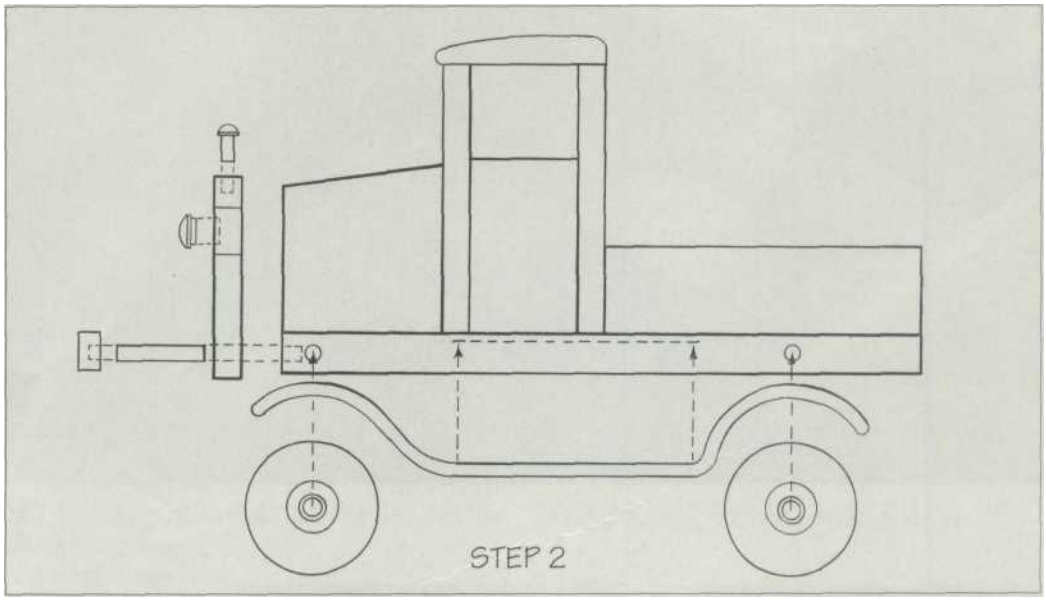
Begin gluing several pieces of stock together to make the thick block for the engine section. Cut this piece to size then saw the slants on the sides and use a plane and sander to form the top countour.

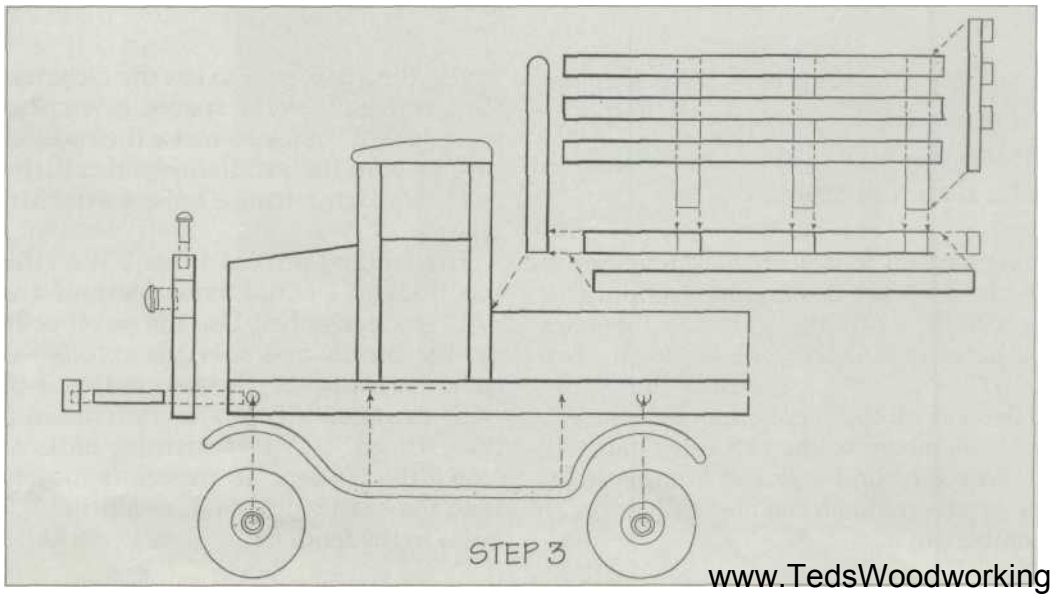
Next, finish sand all the pieces then join the cab front and back members to the cab sides and add the cab roof. Bore the blind axle and bumper holes in the base piece then attach the engine block, cab and back members to it.

Use the scroll saw to cut the radiator frame then cut a series of evenly spaced saw cut grooves in a piece of 3/8" stock to make the radiator frame. Be sure to bore the headlamp and radiator cap holes in the radiator frame before attaching it to the chassis.

The fenders are cut from 1 1/2" thick stock. If this thickness is not available glue two pieces of 3/4" stock together. Use the scroll or hand saw to cut the profile and save the cutoffs—use them as back-up supports during sanding which is done with drum sandling attachments in a drill. Use thin, 19 ga. 1-1/4" finishing nails and glue to attach the fenders. To prevent splitting use a nail, with the head clipped off, as a drill bit to bore pilot holes in the fenders.







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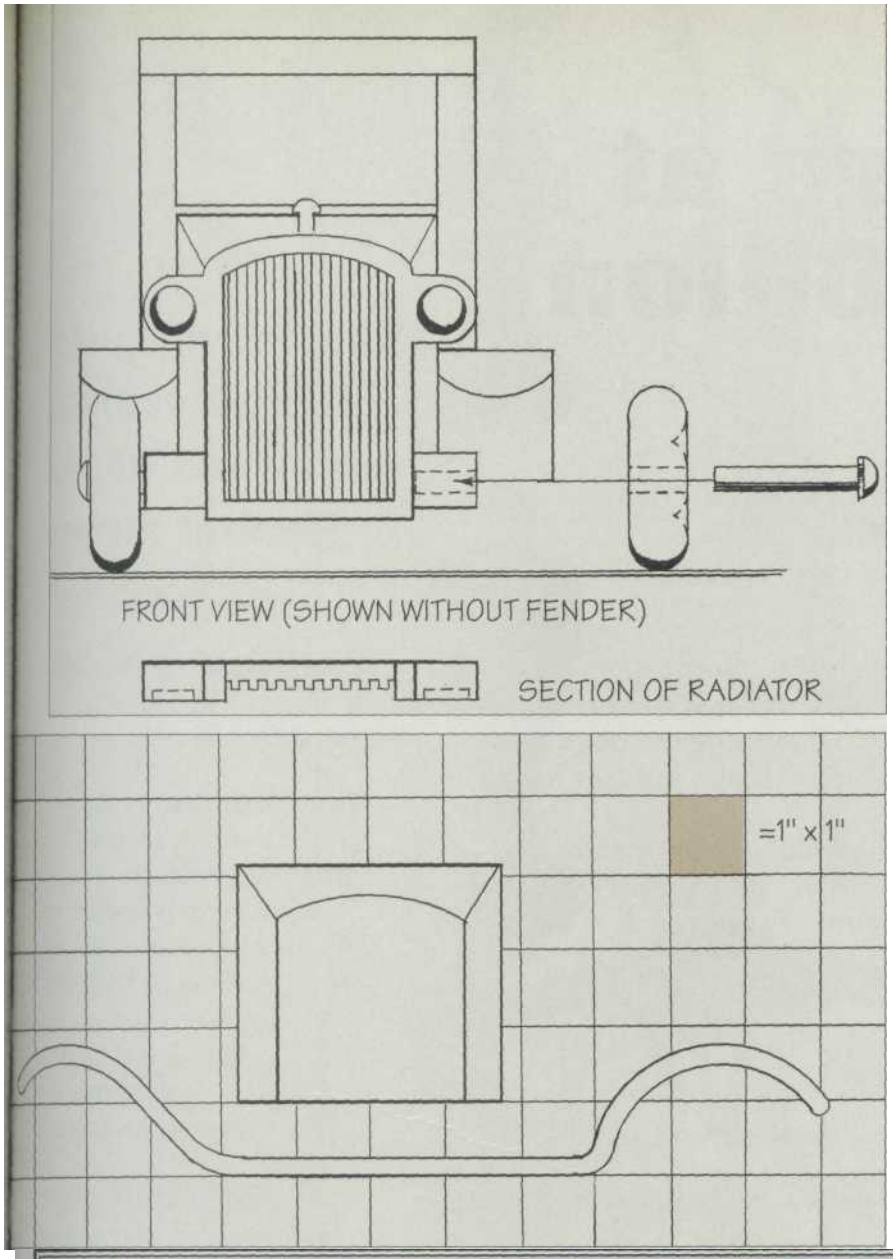

The dump truck cargo container has two pivoting parts; the bin which tils back on a pair of hinges, and the tailgate door which swings open when the bin is tilted up. Attach the hinges to the bin first then hold the bin in a fully raised vertical position so it butts against the rear of the body while marking the hinge screw holes.

To assemple the rails on the stake truck nail and glue the stakes into place in the bed notches then alternately lay the assembly on its sides and attach the rails in place with a dab of glue at each intersection.

The special parts including axle pegs, wood buttons and wheels are available from hobby and craft shops or through mail order woodworker's supply outlets.

The trucks may be clear finished with shellac or varnish or they may be painted with brightly colored non-toxic paints.

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TOY STAKE TRUCK MATERIAL LIST

All dimensions are in inches.

Truck body quantity is listed for one truck

QTY.	DESCRIPTION		QTY.	DESCRIPTION	
1	3/4 x 4-1/2 x 12	(truck base)	2	5/8 dia. wood button	(headlight)
1	3 x 3-1/8 x 3-1/2	(engine)	2	5/16 dia. x 1-5/8 dowel	(bumper supports)
1	1/2 x 4-1/2 x 5	(cab front)	1	3/8 x 3/4 x 5-3/4	(bumper)
1	1/2 x 4-1/2 x 5	(cab rear)	1	7/32 dia. x 9/16	(radiator cap)
2	1/2 x 2 x 3-1/4	(cab side)			
1	1/2 x 3-5/16 x 4-1/2	(cab roof)	*Additional parts for stake truck:*		
1	3/4 x 1-5/8 x 3	(truck front)			
2	3/4 x 1-5/8 x 6	(truck side)	1	1/2 x 5-1/2 x 8	(bed)
1	3/4 x 1-5/8 x 3	(truckrear)	1	1/2 x 4-1/2 x 5-1/2	(front)
1	1-1/2 x 1-3/4 x 11-5/8	(left fender)	7	5/16 x 1/2 x 3-1/2	(stake)
1	1-1/2 x 1-3/4 x 11-5/8	(right fender)	8	5/16 x 1/2 x 8*-13/16	(side rail)
4	2-1/2 dia. x 3/4	(wheel)	4	5/16 x 1/2 x*-5-1/2	(rear rail)
4	5/16 dia. x 1-7/8	(axle peg)			
2	3/4 x I x 1-5/8	(gas tank/tool box)			
1	1/2 x 3-3/4 x 4-1/2	(radiator)			
1	300/8 x 2-1/4 x 3-1/4	(radiator grille)			

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TOY BOX

This little chest, which can hold a bunch of easily accessible toys, turns into a convenient bench when the top is closed. And the lid is controlled by a spring-tensioned support that prevents accidental slamming on little fingers.

1--Tack nail a strip to the back of each panel. The strip should ride in the miter gauge groove as the panel is being cut.

Next, rip and crosscut maple edge banding and glue it to the panels (Photo 2). We used 3-way clamps, but you can try bar clamps or even masking tape. Note that the top edge bands of the end panels are slightly long, so they'll be sawn at an angle when the ends are cut to shape. Also, use three 19-gauge brads partially driven into each edge band to keep it from sliding. Band all the panels in this fashion -- except the lid, which gets its edge bands after the chest is assembled.

2--Glue and clamp each of the edge bands to the panels. Note that the top edge band of the end panel is just slightly long.

After the glue dries, scrape off glue beads and plane edge bands flush to the panel surfaces.

Next, set the table saw miter gauge to 35 degrees and make the angled cuts on the end panels (Photo 3). Glue and clamp the edge bands onto the sawn surface. We cut the panel dadoes and grooves with a router and a 1/2-in.-dia. straight bit. A rectangular frame is used to guide the router to make these cuts (Photo 4). Be sure that the side rails are parallel and are spaced to fit the diameter of your router base, plus the difference between the diameter of the router bit and the width of the required dado or groove. You must precisely measure the thickness of the plywood before setting the distance between the rails. (Hardwood plywood is always slightly thinner than its stated dimension.) Tack nail a movable stop across the rails to control the length of the cut, and cut each groove or dado in two passes. Then, using a chisel, cut the ends of the grooves square.

Making The Splat Rail And Assembly

Cut the splats to shape, then smooth their edges. The pieces will be too small to clamp to a bench. Instead, use a 1/16-in.-radius corner-rounding bit in the router table for the job (Photo 5).

4--Cut grooves and dadoes in the end panels with a router. Then tack nail a block across the rails to stop the cut.

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With the dado head in the table saw, cut the groove in the top rail and the edge band on the back panel. Then cut the filler blocks to length, leaving the four end blocks 1/2 in. longer than the others. Remember to round off the rail edges before assembling the workpieces.

5--Since the splats are so small, it's best to round over their edges on a router table. A ball-bearing bit usually works best.

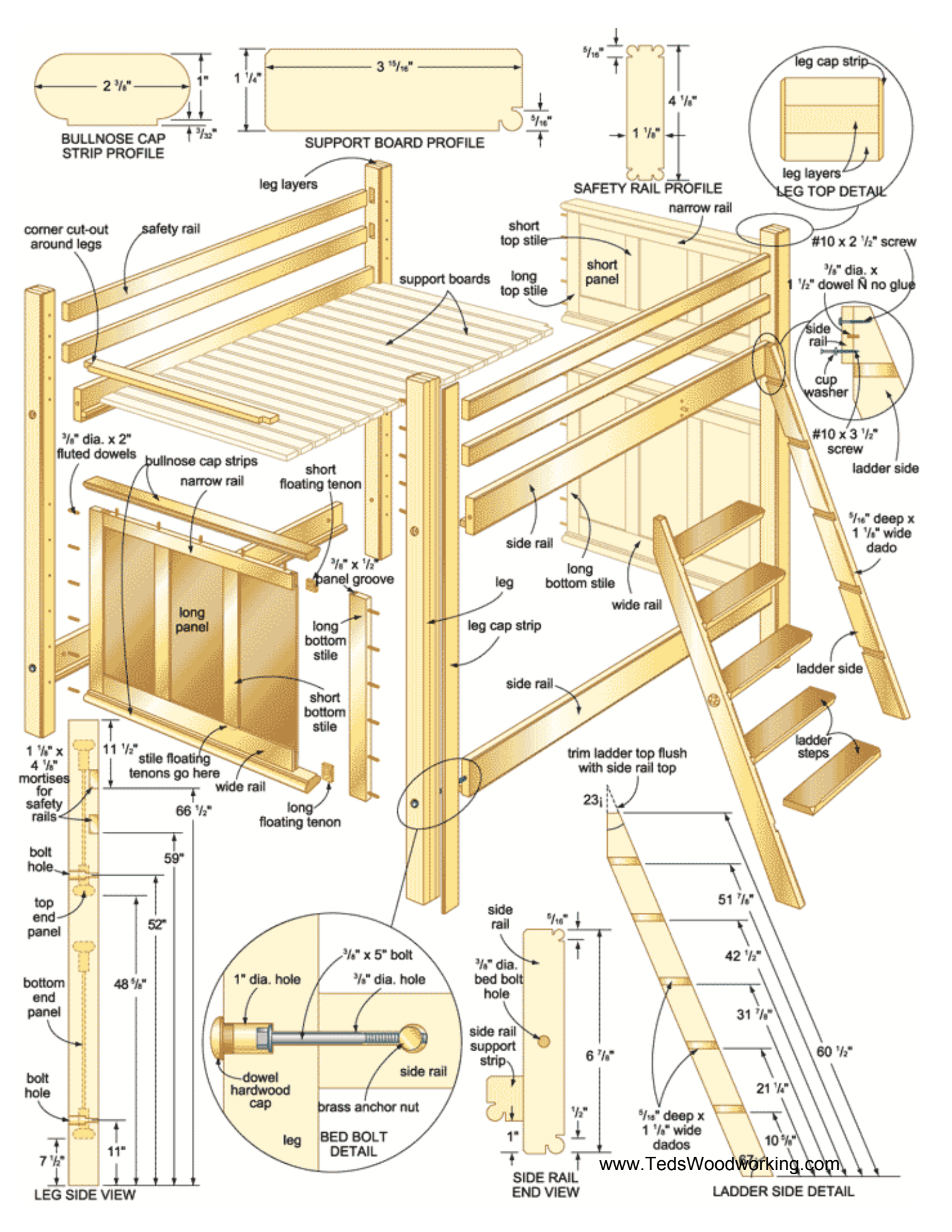
When the back assembly is dry, complete the project in the following sequence: Insert the back panel into the groove (Photo 7). Join the bottom and front to this subassembly, then add the second end and lay the chest on its back. Next, glue and clamp the entire assembly together (Photo 8) and check it for square
Cut the lid panel to size, glue and clamp the side bands to it and then add the front and back bands. Install the hinge and lid support, attach the standoffs and relieve any sharp corners with fine sandpaper. Finally, apply several coats of polyurethane to finish off the project.

6--Insert the splats and spacer blocks in the top rail. After the glue has dried, repeat the procedure on the back panel.

7--Begin the assembly by inserting the back into an end panel. Next, add the bottom and front, then the other end.

8--Clamp the chest using five bar or pipe clamps. Be sure to check the assembly for square before allowing the glue to set.

BUNK BEDS


2 3/8"
1"
3/32"
BULLNOSE CAP STRIP PROFILE
1 1/4"
3 15/16"
5/16"
SUPPORT BOARD PROFILE
5/16"
4 1/8"
1 1/8"
SAFETY RAIL PROFILE
leg cap strip
leg layers
LEG TOP DETAIL
leg layers
corner cut-out around legs
safety rail
support boards
narrow rail
short top stile
long top stile
short panel
#10 x 2 1/2" screw
3/8" dia. x 1 1/2" dowel N no glue
side rail
cup washer
#10 x 3 1/2" screw
ladder side
3/8" dia. x 2" fluted dowels
bullnose cap strips
narrow rail
short floating tenon
3/8" x 1/2" panel groove
long panel
long bottom stile
short bottom stile
leg
leg cap strip
side rail
long bottom stile
wide rail
5/16" deep x 1 1/8" wide dado
ladder side
ladder steps
side rail
trim ladder top flush with side rail top
1 1/8" x 4 1/8" mortises for safety rails
11 1/2"
stile floating tenons go here
wide rail
66 1/2"
long floating tenon
bolt hole
59"
top end panel
52"
48 5/8"
bottom end panel
bolt hole
7 1/2"
11"
LEG SIDE VIEW
1" dia. hole
3/8" x 5" bolt
3/8" dia. hole
side rail
dowel hardwood cap
brass anchor nut
leg
BED BOLT DETAIL
side rail
5/16"
3/8" dia. bed bolt hole
side rail support strip
6 7/8"
1/2"
1"
SIDE RAIL END VIEW
23"
51 7/8"
42 1/2"
31 7/8"
60 1/2"
21 1/4"
10 5/8"
5/16" deep x 1 1/8" wide dados
LADDER SIDE DETAIL
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For the head and foot boards	*Size*	*Qty.*
Legs	3 1/4" x 3 5/8" x 78"	1
Leg cap strips	3/16" x 3 1/4" x 78"	8
Long panels	3/8" x 9 7/8" x 24 1/2"	6
Short panels	3/8" x 9 7/8" x 17 5/8"	6
Long top stiles	1 1/8" x 2 3/4" x 24"	4
Long bottom stiles	1 1/8" x 2 3/4" x 30 3/4"	4
Short top stiles	1 1/8" x 2 3/4" x 17"	4
Short bottom stiles	1 1/8" x 2 3/4" x 23 3/4"	4
Narrow rails	1 1/8" x 2 3/4" x 33"	4
Wide rails	1 1/8" x 4 1/4" x 33"	4
Short floating tenons—*hardwood*	3/8" x 1" x 2 1/4"	16
Stile floating tenons—*hardwood*	3/8" x 1" x 1 3/4"	16
Long floating tenons—*hardwood*	3/8" x 1" x 3 3/4"	16
Bullnose cap strips	1 1/8" x 2 3/8" x 38 3/8"	8
Dowels	3/8" dia. x 1 1/2" fluted	40
For the mattress support assembly		
Side rails	1 5/16" x 6 7/8" x 76 3/4"	4
Side rail support strips	1 1/8" x 1 3/4" x 76 3/4"	4
Support rail screws	#14 x 2" round head, brass	24
Support boards	1 1/8" x 3 15/16" x 40 7/8"	40
Bed bolts	3/8" dia. x 5"*	8
Bed bolt caps	hardwood, 1" dia. domed caps	8
For the ladder and safety rails		
Ladder sides	1 1/4" x 4 3/8" x 61 1/2"	2
Main ladder steps	1 1/8" x 5 1/8" x 16 1/2"	5
Safety rails	1 1/8" x 4 1/8" x 78 3/4"	4
Long ladder screws and cup washers	#10 x 3 1/2"	2
Short ladder screws and cup washers	#10 x 2 1/4"	2
Dowels	3/8" dia. x 1 1/2" fluted	2

Start With The Panels

Variations of the tudor rose are all over my house. Although the spruce is strong, it proved difficult to slice cleanly. Consider white pine or basswood for carving

Since construction-grade wood needs time to dry while you're building, I'll lead you through the preparation of parts in stages. Moving from one group of parts to another as you work allows wood to cup and twist (as it inevitably will) while you still have the opportunity to do something about it.

The panels are a prominent part of the bed, so choose and combine grain patterns with care. This is where artistry comes in. Since the finished panels are about 3/8" thick, you can easily get two panel parts by splitting 1 1/2" lumber down the middle, on edge. This leaves lots of extra wood for jointing and planing operations. If you don't have a bandsaw, rip the panel parts no wider than 4", then slice them in half, on edge, in two passes across your tablesaw. Splitting thick stock like this naturally reveals striking book-matched grain patterns on matching parts. This is good stuff, so make the most of it.

Next, spend time at the workbench arranging panel parts so they look their best. Mark the location of neighbouring pieces, then set them aside to dry for at least three or four days before jointing and edge gluing. Thin, newly split pieces like these tend to cup as they dry, so you'll want to let that happen before jointing. I designed the completed panels to be less than 12" wide so they could be milled in any benchtop thickness planer after lamination. Set the panel parts aside for now.

Bags And Bags Of Shavings

Most of the bunk bed parts are 1 1/8" thick, meaning you'll have to spend hours working with your planer to mill the 1 1/2"-thick boards down to size. You'll save time if you rough-cut all stiles, rails, bullnose cap strips, side rail support strips, support boards, safety rails and ladder parts to width first, instead of running uncut lumber through your planer, and then cutting these parts. Joint and plane components to 1/8" thicker than final size, then let them sit for a week with a fan blowing on the stickered pile before milling to final thickness. Keep the parts in separate groups so you can work on each kind in turn.

Laminate The Legs

The bunk bed legs are thick and long, making them the most troublesome part of the project. The plans show how each leg has five parts: three hefty internal layers, capped by two face strips that hide the lamination lines.

Divide the 12 leg layers you cut earlier into four groups: three pieces for each leg. The idea is to arrange the layers so the outer face of each leg looks best. Mark relative layer locations, then joint and plane leg layers to 1 1/4"-thick and glue them together. A few wooden hand screws tightened across the edges of the layers will do wonders to align the parts as the main clamps draw them together. This saves lots of jointing later.

While the leg layers are drying, cut the leg cap strips slightly wider than listed and plane to final 3/16" thickness. When the legs are ready to come out of the clamps, joint and plane them to final size. Glue the cap strips over the sides showing the lamination lines, using as many clamps as needed for gap-free joints. Plane the excess edging flush with the legs, sand and rout a chamfer along all edges. The plans show how the joint line between leg and leg cap disappears if you cut so its edge lands on the joint line.

Head and footboard panels are made of planks sawn in half on edge, so there's lots of bookmatched grain pattern. Use wood with growth rings perpendicular to the panel face

Back To The Panels

Joint one face of each panel member, then joint an edge, before ripping each piece to wider-than-final width and jointing this sawn edge. Keep all panel parts grouped, as you arranged them earlier for best appearance, while dry-fitting the panel parts. When everything looks good, edge-glue the panels, scraping off excess glue after a few hours when it's half-hard.

As the panels are drying, joint and plane the rails and stiles to final size, then trim to length. The plans show how the edges of these parts require grooves to house the panel edges. These grooves also admit floating hardwood tenons that join the panel frames. This is why the panel grooves extend around the ends of the rails. A wing-cutter router bit in a table-mounted router is the best tool for cutting these grooves. Take one pass from each side of the rail and stile parts so the grooves are centred. Aim for a 3/8"- to 7/16"-wide groove, then plane and trim your floating tenons for a snug fit.

The corner of the underside of the top bunk, showing mattress support boards, mattress support strip and the bottom of the headboard where it joins the leg

Dry-fit all stiles, rails and floating tenons under clamp pressure to check for tight joints, then measure the inside dimensions of the frame (to the bottom of the grooves) to determine the ideal panel size. Make the panels 1/16" smaller than these measurements and plane the panels to fit nicely within the grooves. Dry-fit the stiles, rails and panels, then assemble the frame permanently with glue. Give everything a day or two to dry, then joint the outside edges of the frame parts to level and square them.

Mill the bullnose cap strips on a table-mounted router, then fasten them to the top and bottom edges of the assembled panel frames using 3/8" fluted dowels. With all the parts of this project that needed dowelling, I invested in a self-centering drilling jig to help me bore accurate dowel holes in the panel edges and the ends of the side rails—all parts too large to be bored on my drill press. It worked wonderfully. When the cap strips are glued to the panel frames, run the edge of the assembly over the jointer again, taking a light cut to level the sides for a tight fit with the legs. Install 3/8"-fluted dowels across the leg-to-panel joints, dry-fit under clamping pressure, then join the legs and panel frames permanently. Cleaning glue squeeze-out from the corner where the legs meet the panel frames would be difficult without help. I used Waxilit, a glue resist that looks like skin cream. Smear some across the dry-fitted joints—when the joint is reassembled with glue the product prevents the squeeze-out from bonding to the surface wood. The hardened glue pops off with a chisel.

Refine The Legs And Safety Rails

The plans show how each leg needs counterbored holes for the bed bolts, and two mortises to house the safety rails for the top bunk. Drilling the holes is easy (just don't do it before you've read further), though the mortises demand explanation. I made mine using a router and flush-trimming bit, guided by the shop-made plywood jig. This creates four identical round-cornered mortises in the legs that need to be squared by hand with a chisel. Use these mortises as a guide to plane, rip and joint the safety rails you rough-cut earlier, so they fit into the mortises sweetly. Complete the rails by sanding, trimming to final length and routing quirk beads

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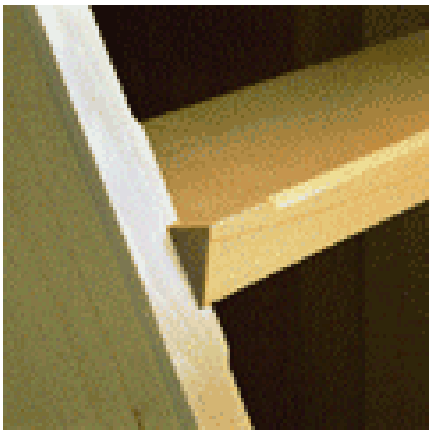
on all four edges. These extend to within 1 1/4" of the end of each safety rail.

Side Rails, Support Strips And Support Boards

These parts connect the head and foot boards, and support the two twin-size mattresses that the bed is made for. Mill and trim these parts to final size, then rout quirk beads on all four edges of the side rails, on one edge of the support strips, and along one edge of the support boards. The plans show the details, though you're free to use whatever profile you like.

Before you go further, think about mattress size. Although there are supposed to be standard sizes out there, the variation from brand to brand can be considerable. It's safest to have your mattresses on hand, then measure them and adjust side rail hole locations in the legs, and the side rail lengths, to suit. The dimensions and locations I used are for mattresses that are slightly larger than printed mattress specs.

Drill holes in the legs and side rails for the bed bolts now, then glue and screw the mattress support strips to the inside edge of the side rails. If I had to build my beds over, I'd raise the support strips 1" higher than where I put them. That's what's shown in the plans. Without an exceptionally thick mattress, the side rails press into your legs as you roll out of bed. Raising the mattresses with the higher support strip location solves the problem .



Chamfer the top front edge of the ladder steps for better resistance to wear. A sharp chisel makes quick work of angling the outer corners of each step

CHILD'S BED

Making the Headboard

The legs are first cut to length and then the mortises are cut into the four leg posts using a router fitted with a 16mm straight cutter, remembering to make handed pairs. It is important to ensure that each corresponding pair of mortises are cut at the same distance from the bottom of each leg so the rails, when fitted to the legs, will be square. The mortises can then be squared with a chisel or alternatively the tenons can be rounded to fit the holes. Rather than cut tenons individually on the end of each rail, cut a length of oak 950mm in length from each of the 200mm wide boards and clamp a straight edge guide in place. Use the router free hand against the guide to cut the rebates to form the tenons. Obviously care must be taken when setting the depth of cut as well as making sure that the straight edges are true on each side of the board. The boards can then be cut lengthways to form the rails and the ends notched by hand to fit the mortises.

A profile/scribe cutter set (Titman RPSS1) is used in the router table to form the profiles on the rail sides and the headboard, temporarily clamped together ensuring all is square. The length of the stiles can now be accurately measured and the appropriate length cut from the oak board. The ends of the boards can now be scribed on the router table without worrying about any breakout as the boards are a little overwidth anyway. After cutting the timber to width, the cutter can be reversed and the stiles profiled to match the rails. It will be noticed that one of the stiles is, in fact, a half width and this is to fit into a rebate cut into the leg to visually balance the panelled effect. Another dry assembly takes place spacing the stiles equally in place and the space for the panels accurately measured. All three panels should measure the same size. Each panel should be cut and planed so that it can fit neatly on top of the profiling with the headboard laid flat. I aim to cut the panel a whisper undersize to allow for any slight expansion in the timber as well as to ensure the assembly is straightforward without putting undue stress on the joints.

A bearing guided panel cutter (Titman RPCB7) is

used to shape the edges of the panels. The depth of cut is set so the panel is a tight fit into the profiled stile with its edge just off the bottom of the groove. With this set up the bearing runs along the sides of the panels so it is important that the edges are straight as any defect here will show up on the finished panel as a kink in the fielding. The footboard is made in exactly the same way.

The Bed Rails

The long side rails are cut to length allowing an extra 60mm in the total length for the mortises and the tenons are formed using the router and a straight edge clamped in place as a guide. Care is taken to prevent the router rocking over the ends and thus removing too much timber. The ends are trimmed so the tenons are a tight fit into the mortises. All four edges are rounded over with a rounding over bit to remove sharp edges and as a decorative feature the top outside edge is moulded with a sunken bead cutter (Titman SBBC4) At this stage some 38 x 19mm softwood can be firmly screwed in place on the inside of each rail near the bottom edge. When the slats are screwed in place on this battening the mattress will sit between the rails rather than level with the top edge. This not only looks neater but it prevents the mattress from sliding around.

Finishing and Final Assembly

All the joints are held together with threaded rods and barrel nuts. This entails boring a hole about 20mm deep on the opposite side of each mortise in the middle of the leg. This should be wide enough to take the steel washer as well as the socket used to tighten the nut. A hole the diameter of the threaded rod is drilled through the leg and into the ends of the tenons to a depth of about 100mm into each rail. A further hole is drilled either in the back of the headboard or footboard or on the inside of the side rails into which is inserted the barrel nut. Great care should be taken to ensure that this hole does not break through the other side of the rails where it would be seen and ruin the effect of the bed.

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A small rail with a decorative moulding on each

side can be made to fit on top of the headboard and the footboard. This can have a shallow 20mm wide groove underneath so it fits neatly on top of the rails and can be held in place with a few spots of glue. Lengths of softwood, 75 x 25mm, are screwed in place with a 25mm gap between each to support the mattress.

Four acorns are turned on the lathe using the offcuts of timber from when the legs are cut to length. A spigot is left under the acorn and glued into a hole drilled on top of the legs.

The finish is a matter of personal preference but I covered all surfaces with a 50/50 mix of raw linseed oil and turpentine to bring out the grain and left this to dry thoroughly for a couple of days. Three coats of button polish are brushed on and allowed to dry. This is gently cut back with 0000 grade wire wool and wax and then buffed to a soft shine. As a finishing touch antique brass bed post covers were screwed in place to cover the nuts.

Cutting List

Item	Quantity	Dimensions (mm)
Legs	4	75 x 75 x 1200
Headboard Panels	1	280 x 20 x 2500
Headboard / Footboard Stiles and Rails	2	200 x 20 x 1500
Bed Side Rails	2	75 x 35 x 2000

BOOKCASE

Cutting the Parts

For precise crosscuts, first make a simple, self-aligning T-guide for your circular saw. Cut a piece of 1/2-in. plywood to 2 1/2 x 24 in. and glue and screw it to a roughly 12-in.-long piece of 1 x 4 pine that will serve as the crossbar of the T. Center the plywood strip along the 1 x 4 and make sure the pieces are perfectly square to each other.

Butt the crossbar of the T-guide against the edge of a piece of scrap lumber, tack the guide in place and make a cut through the 1 x 4 with your saw base guided by the plywood strip. Then, trim the 1 x 4 on the opposite side in the same way. Now, the ends of the 1 x 4 can be aligned with layout lines on the stock for precise cut positioning.

Begin construction by using a tape measure to mark the length of a side panel on 1 x 10 stock, and lay out the cut line with a square **(Fig. 1)**. The side panels on our bookcase are 48 in. long.

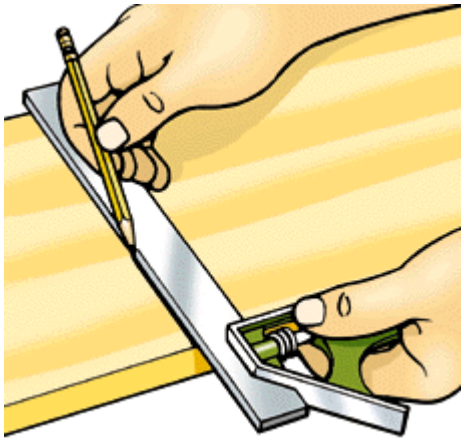

Fig. 1 Mark the lengths of the bookcase side panels on 1 x 10 lumber and use a square to lay out the crosscut lines.

Place the T-guide against the edge of the stock and align its trimmed end with the cut line. Tack the guide in place and use your circular saw to make the cut **(Fig. 2)**.

To support your work during the cuts, use 2 x 4s spanning two saw-horses for a temporary bench and clamp your work in place. Set your circular saw cutting depth so the blade cuts about 1/8 in. into the 2 x 4s.

After both sides are cut to length, lay out and cut the five shelves to length to suit the width of your bookcase. Our shelf length is 31 in.

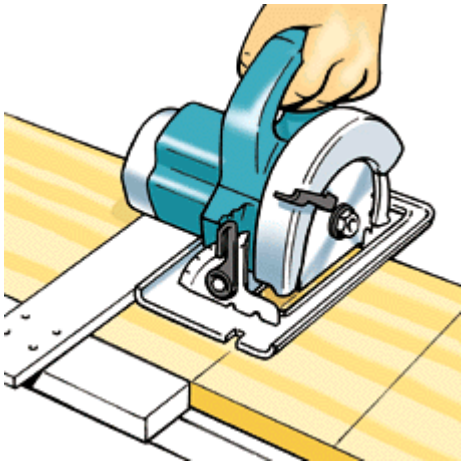

Fig. 2 With a T-guide cut to match your saw, align the end of guide with crosscut line. Tack guide to the work and then make the cut.

Rip the four lower shelves to 8 7/8 in. wide to allow for the thickness of the case back. Clamp each shelf to the sawhorses and tack a straight strip to the work to guide your circular saw (**Fig. 3**).

Next, cut the 10 shelf-support cleats from lengths of 1/2 x 3/4-in. parting strip. Use a handsaw to cut the pieces slightly oversize, then gang the pieces together with masking tape. Mark the cut lines and use your circular saw and T-guide to cut the cleats to 8 7/8 in. long (**Fig. 4**).

Because we varied the spaces between the shelves, the vertical back cleat lengths vary. Rough cut and mark the back cleats in pairs. From the top down, the lengths are 8, 9, 9 1/2 and 11 1/4 in. When cutting the back cleats with the T-guide, first gang them together so all the marks on one side align. After the cut, untape the cleats and reposition them so the marks on the opposite side are aligned for the next cut.

Fig. 3 Use a straight strip as a guide when ripping stock for the four lower shelves to 8 7/8 in. The top shelf remains a full 11 1/4 in.

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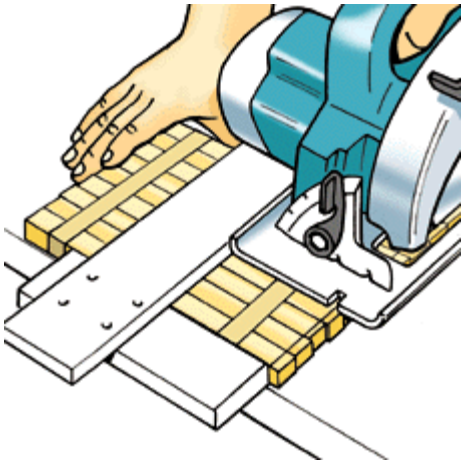

Fig. 4 After cutting shelf cleats oversize, gang them together with tape, mark the cut lines and trim with a T-guide and circular saw.

Assembly

First mark the shelf cleat locations. Hook your tape measure to the top edge of a side panel, extend the tape and place marks at the following dimensions: 3/4, 10 1/4, 20 3/4, 31 3/4 and 44 1/2 in. These marks indicate the top edges of the shelf cleats. Transfer the marks to the other panel. Lay both side pieces edge to edge with the marks on the outer edges and use a rule or straightedge to extend the shelf locations across both panels at once (**Fig. 5**).

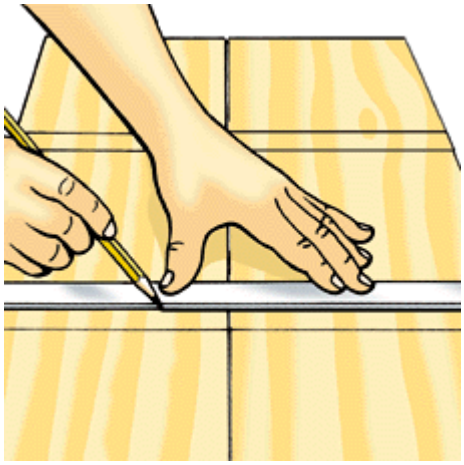

Fig. 5 Butt sides together with shelf-location marks on outer edges. Use a straightedge to extend the shelf marks across work.

Use 2d nails and glue to attach the shelf cleats to the sides. Position the cleats so they're flush with the front edges of the sides. Then, attach the vertical back cleats, leaving a 3/4-in. gap at the bottom of each back cleat for a shelf (**Fig. 6**). The gaps will help to keep the shelves aligned during assembly. Align the back cleats with the back ends of the shelf cleats to provide the 3/8-in. recess for the back panel.

Fig. 6 Nail and glue shelf cleats and back cleats to the side panels. Note that cleats are recessed 3/8 in. from back edge of sides.

To join the sides and shelves, first lay a side panel on a few 2 x 4s placed on the floor. With a helper assisting, stand the shelves in position and lay the opposite side on the shelf ends. Start a pair of 6d finishing nails at each shelf location so the points just penetrate the shelves. Lift the side off and apply glue to the endgrain of the shelves. Let the glue soak in for a few minutes, then apply a second coat. Follow with a coat of glue on the sides and cleats. Replace the panel using the nail points to align the shelves. Then drive the nails (**Fig. 7**) and set them below the surface.

After the first side is attached, grasp the sides at one end while your helper grasps the opposite end and flip the assembly over. Secure the remaining side and check that the case is square. If necessary, tack a diagonal brace across the back to hold it while the glue sets. When the glue is dry cut a piece of parting strip to fit between the two top cleats and under the top shelf. This piece will be set 3/8 in. in front of the top shelf rear edge to provide room for the back panel. Glue and nail this long cleat to the shelf.

Fig. 7 Secure one side to the shelves with glue and 6d finishing nails. Then flip the assembly over and attach the other side. Set all nails.

Adding the Fascia

To fit the 1 x 2 fascia over the case front edges, first mark the stock for crosscutting. Make the vertical pieces 48 in. long to match the sides and mark the horizontal members at 29 1/2 in. Rough cut the pieces to length and use the T-guide and circular saw to trim them squarely to exact size.

Apply glue to one of the vertical members and nail it to the case so its edge is flush with the side. Then, add each horizontal member with glue and nails, keeping the top edges flush with the shelf tops (**Fig. 8**). Finally, add the remaining vertical member with nails and glue.

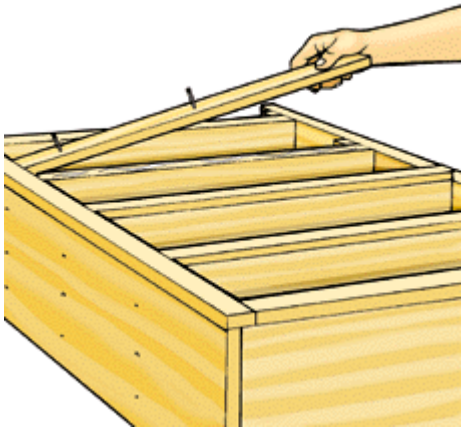

Fig. 8 Attach the 1 x 2 strips to the case starting with a vertical member. Then, add the horizontal pieces and the other vertical.

Use 1 x 4 stock for the front and two side baseboard pieces. Cut the length of each side piece to 10 in. long and glue and nail the parts in place. Then, cut the front baseboard piece to 34 in. long and secure it so its ends are flush with the side pieces.

After the glue has dried, use a block plane to trim a chamfer around the top edge of the baseboard. Plane the side pieces first, working from front to back to avoid splitting the corners of the front piece. Then, plane the front piece to match. It helps to lean the plane against the case to maintain a uniform angle (**Fig. 9**).

The final component is the case back. Lay out the cut lines on 1/4-in.-thick lauan plywood. Tack a straight strip to the panel to serve as a guide for your circular saw and cut the stock to size (**Fig. 10**). Attach the back panels to the case with glue and 1-in. finishing nails.

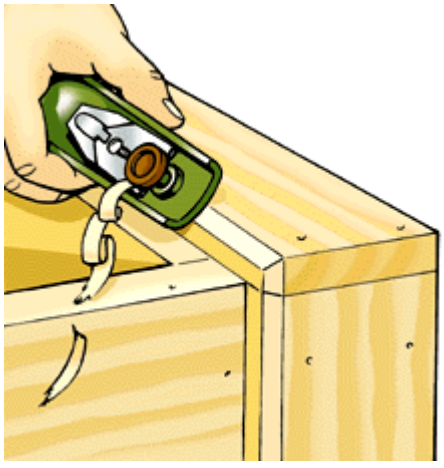

Fig. 9 Use a block plane to shape the chamfers on the baseboard. Rest the plane against the case to maintain a uniform angle.

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Fig. 10 Cut the 1/4-in.-thick back panel to size with a circular saw. Use a straight strip as a guide when making the cuts.

Finishing

First make sure all the nails are set below the surface. Use a putty knife to fill the nail holes with wood filler and let the compound dry (**Fig. 11**).

Sand the entire bookcase with 120- followed by 220-grit sandpaper. Then, use a sanding block and 220-grit paper to slightly ease all corners. Thoroughly dust off the case with a tack rag.

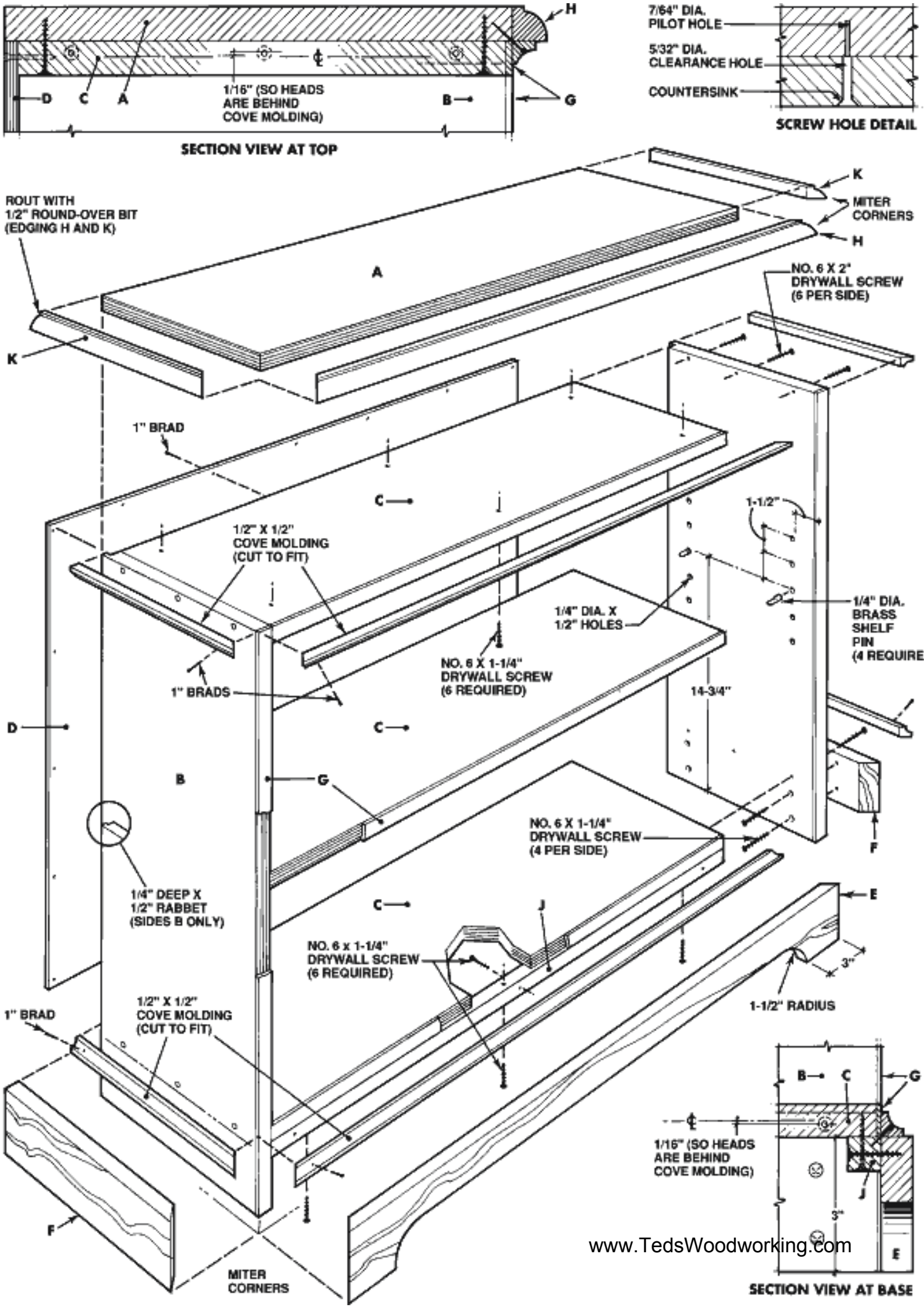
If you plan to paint your bookcase, first apply two coats of shellac over each knot to prevent the knots from bleeding through the final paint job (**Fig. 12**).

Then, prime and paint the bookcase according to the manufacturer's instructions.

Fig. 11 Use a nail set to drive all nails below the surface. Then apply wood filler over the nailheads with a putty knife.

Fig. 12 Apply shellac to any knots before painting. This will seal the knots and prevent sap from bleeding through.

TRADITIONAL BOOKCASE



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CUTTING AND ASSEMBLY PROCEDURE
Refer to the Assembly Diagram.

1. Cut the 3/4" plywood pieces (A, B and C) to the sizes given in the Cutting List.

Woodworker's Tips: Many people have trouble cutting hardwood plywood cleanly, especially across the grain. For this bookcase, you'll have to master this skill, because some of the cuts will show on the finished piece. Here are a few tricks:

- Be aware of which side of your plywood is the good side, and keep it facing up while cutting on the table saw.
- Adjust your saw so the fence is exactly parallel to the blade, and the miter gauge slots are exactly perpendicular to it. If not, the blade will tear up fibers where it touches the wood behind the cut.
- For the smoothest cuts, use a 10" carbide-tipped saw blade with 60 to 100 teeth.
- If you're still not getting clean cuts, score the cutting line deeply with a sharp utility knife before you saw.

2. Cut the solid wood pieces (E, F, G, H, and K) a couple of inches longer than the dimensions given, so they can be trimmed to exact size later. Part J can be cut to the specified size now.
3. Rip part G into 1/8" strips for gluing to the front edge of pieces B and C. Your saw blade will be close to the fence, so use a push stick to guide the wood.
4. Glue the strips (G) to the front edges of pieces B and C using yellow carpenter's glue. After the glue is dry, cut or sand the strips so they're flush with the plywood. You can do this with a block plane or belt sander. If you use a sander, be careful not to cut or sand through the thin veneer of the plywood. If you've never tried this operation before, you may want to experiment on some scrap plywood first. When the strips are flush with the veneer, trim the ends with a small handsaw.

Woodworker's Tip: Use strips of masking tape as clamps for the edge strips. Tape is strong enough for this job and less cumbersome than bar clamps. Apply a tape strip about every 3-4".

5. Cut mitered ends on the 3/4" edging (H, K) that is used for the top (A). Cut the front piece (H) first, so that the miters are exactly flush with the corners of the plywood, then cut the side pieces (K). Clamp them to be sure they fit, then glue. The sides can be long in back and trimmed after the glue is dry. When the glue has dried, sand the edging flush with the plywood.
6. Cut the profile on the edge of the top with a router, using a 1/2" round-over bit with a pilot bearing.
7. Mark where the screws will go into the sides of the case, the top and the cleats. Drill the countersinks, then the clearance holes for the screws. Note that these holes are slightly off-center (about 1/16"), so the cove molding you add later will completely cover them.

Woodworker's Tip: Drilling first and countersinking second can result in a rough, chatter-marked hole, especially on oak plywood, which tears easily. Drill the countersink first, or use a combination drill/countersink bit.

8. Carefully lay out and then drill the shelf pin holes into the inside face of the sides (B).

Woodworker's Tip: A common mistake is to drill the shelf-pin holes inaccurately, resulting in a shelf that wobbles because it's not sitting on all four corners. To avoid this, mark out the holes very carefully; use an awl to prick the surface where you want the drill bit to start; and use a brad-point drill bit, which won't easily wander off the mark.

9. Cut the rabbets on the back edges of the sides (B). The easiest way to do this is with your table or radial arm saw, making two cuts and adjusting the fence after the first cut. Or, install a dado blade and set up the saw to make the rabbets in one pass.
10. Finish-sand all the pieces you've made so far. Start with 120-grit paper and finish with 220-grit.

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Woodworker's Tip: It's a good idea to do as much of your sanding as you can before any pieces are assembled. That way, you eliminate having to sand inside corners. The same goes for finishing: If you can finish parts separately and then assemble them, do it. Remember, however, that glue won't stick to a finished surface, so don't put finish on the surfaces of glue joints.

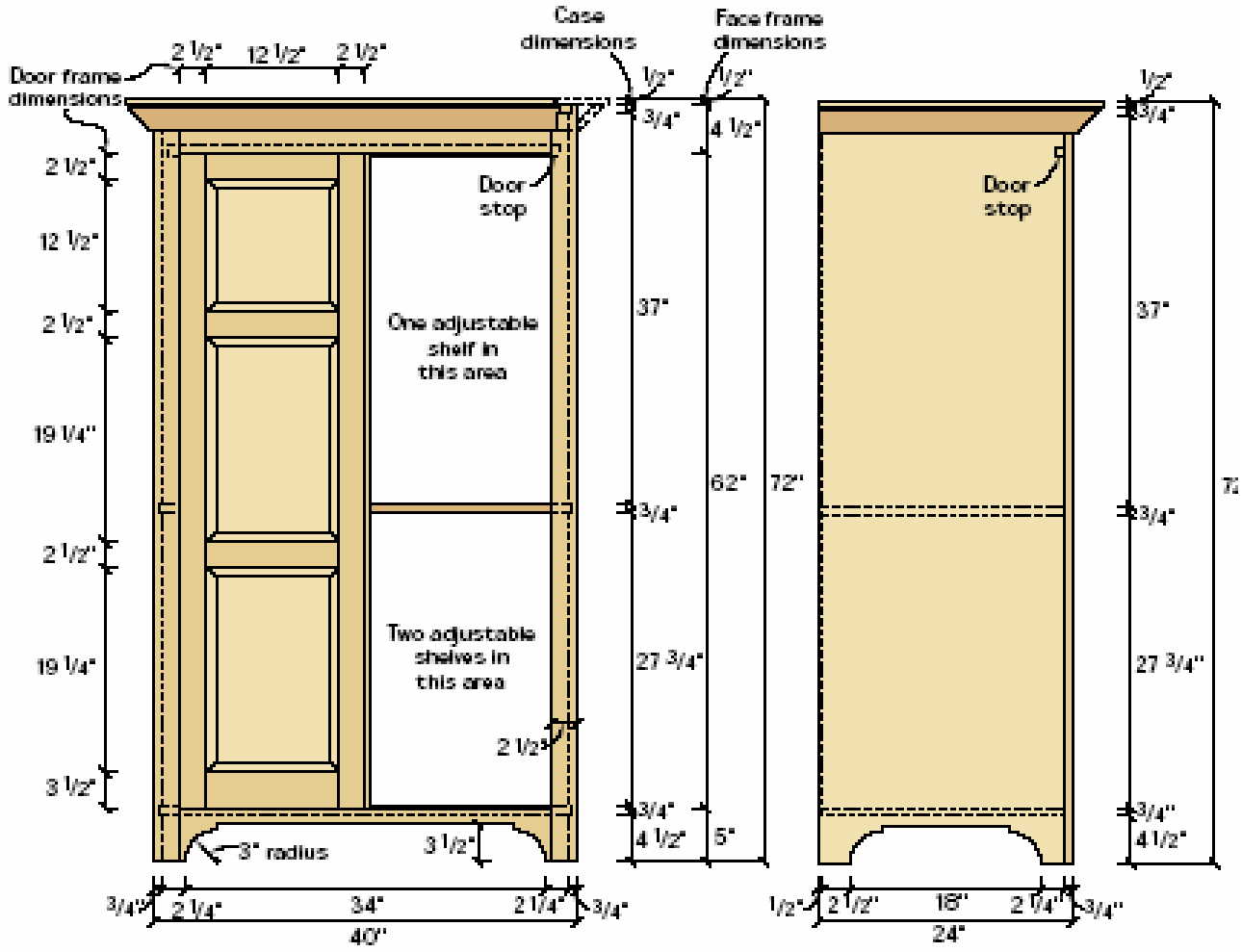
11. Dry-clamp the pieces to be joined with screws and drill the pilot holes, using the countersunk clearance holes as your guide.
12. Screw the bookcase together. Start by screwing the top and bottom shelves (C) to the sides (B). Then screw the base cleat (J) to the bottom shelf (C). Next, screw the top (A) to the case.
13. Hold the base front piece (E) to the front of the bookcase and mark on its inside surface where the miters should be cut. Cut these miters, then cut the miters on the base sides (F).

Woodworker's Tip: Test your miter cuts on a couple of pieces of scrap (plywood works fine) before making the final cuts.

14. When the three base pieces (E and F) fit well, cut the curved opening at the bottom of the base front (E). Give all the base pieces a final sanding, then screw them onto the case. Use yellow carpenter's glue on the miter joints and other surfaces that meet. Trim the ends of the side pieces (F).
15. Mark the cove moldings for cutting the miter joints, and fit them on as you did with the edging and base piecesthe front first and then the sides. Drill pilot holes for the brads, not just into the cove molding, but into the bookcase as well. Nail on the molding, sink the nailheads slightly with a nail set, push putty into the nail holes. When the glue is dry, trim the ends of the molding and sand them smooth.
16. Cut the back (D) to size and sand it, but don't nail it on until you've completed the finishing.

To prepare for finishing, slightly break all sharp edges on the bookcase with sandpaper.

TRADITIONAL ENTERTAINMENT CENTER



Shaker Entertainment Center

No.	Item	Dimensions T W L	Material
2	Face frame stiles	3/4" x 2 9/16" x 71 1/2"	Maple
1	Face frame top rail*	3/4" x 4 1/2" x 37"	Maple
1	Face frame bottom rail*	3/4" x 5" x 37"	Maple
3	Door stiles	3/4" x 2 1/2" x 62"	Maple
1	Door stile	3/4" x 3" x 62"	Maple
6	Door rails*	3/4" x 3 1/2" x 14 1/2"	Maple
2	Door bottom rails	3/4" x 3 1/2" x 14 1/2"	Maple
2	Door panels	5/8" x 13" x 13"	Maple
4	Door panels	5/8" x 13" x 19 3/4"	Maple
2	Cabinet sides	3/4" x 23 1/4" x 71 1/2"	Maple
3	Fixed shelves	3/4" x 22 3/4" x 39"	Maple
3	Adjustable shelves	3/4" x 22 1/4" x 38 1/4"	Maple
1	Back	1/2" x 39 1/2" x 71 1/2"	Maple
1	Door stop	3/4" x 7/8" x 37"	Maple
1	Crown moulding	3/4" x 3 3/4" x 96"	Maple
1	Crown cap	1/2" x 3 1/8" x 96"	Maple
6	Hinges, Lee Valley #00H52.03, $2.30 each, 800-871-8158 or www.leevalley.com		

*Measurement includes 1"-long tenon on both ends

As cabinet construction goes, this is about as basic as it gets, and it still offers old-world joinery, styling and strength. The entire piece is solid lumber, using a face-frame front and a shiplapped back. The raised-panel

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doors are held together with mortise-and-tenon joinery, and the crown moulding is all simple cuts on the table saw and jointer.

I start construction on face-frame cabinets by making the face frame first. All the other pieces will be sized to fit the frame, so it just makes sense to begin there. Also, the width of the face frame's stiles are 1/16" wider than shown in the drawing. This will allow you to trim them flush to the case after assembly.

There are a number of ways to fasten a face frame together, but when I'm making a piece of furniture that has the potential to be moved every so often I prefer the strongest joint I can think of — mortise and tenon. That's because if it's moving it's racking. While a strong back will help keep the cabinet from racking, the face frame does most of the work. In addition, if the piece is a reproduction, like the one here, it's appropriate to use a mortise-and-tenon frame.

I prefer to cut the tenons on the ends of the rails first, then use the tenons to lay out the mortises on the stiles. Set up your table saw to cut the 3/8" x 1"-long tenons, centered on both ends of the top and bottom rails. Then set up your mortiser to cut the mating mortises, setting your depth to 11/16" to avoid having the tenon bottom out in the mortise.

Once the mortises and tenons are cut, assemble the frame by putting glue in the mortises. Don't overdo it; glue can keep the tenon from seating properly in the mortise. After the glue is dry, I pin the joints using 3/8"-square stock.

Three-Panel Doors

Since I'm already set up for making mortise-and-tenon joints, I go ahead and make the doors next. The doors are basic frame-and-panel construction using raised panels with an 8° bevel on the front face. Determine the size of the doors by making them exactly the size of the opening in the face frame. We'll trim them to fit later.

Before cutting the joints for the doors I make the groove in the rails and stiles for the raised panels. These grooves are 3/8" x 3/8" and are centered on the inside edge of each piece, with both edges of the center rails receiving a groove. After the grooves are run, start making the tenons on each end of the rails. Make the tenons and mortises the same size as you used for the face frame. Because the panel groove was run through the ends of each stile, the tenons on the top and bottom rails need to be haunched (the tenon shoulder is left wider to fill the notch left by the groove).

Next mark the locations for the mortises at the locations shown in the diagrams, and cut the mortises in the stiles.

The panels themselves are cut to size allowing ½" extra in both height and width to fit into the grooves in the door frame. With the panels sized, set your table saw blade to an 8° angle. Then set the rip fence to bevel the faces of the panels. The distance between the fence and blade should be set so that the bevel is about 3/8" thick, ¼" in from each edge.

When the door pieces are ready, assemble the doors, again being careful not to use too much glue on the joints. Clamp up the doors and determine if the doors are square by measuring corner to corner. The distance should be the same in both directions. If not, adjust the door by tightening a clamp diagonally across the longer length. When everything is square, tighten the clamps and set the doors aside for the glue to cure.

When the doors are ready, take them to your saw and cut a 3/8" x ½" rabbet on the two interior edges to form a shiplap joint to keep the dust out. Then head to the jointer and trim them to size, allowing a 1/16" gap all the way around the doors. When fitting the doors, run the top and bottom of the doors over the jointer first, as the end grain on the ends of the stiles may tear out. By running the long grain edges last, you should be able to clean up any tear-out on the stiles.

With the doors fit, go ahead and mount the doors in the face frame. I used 2½" non-mortise butt hinges (see schedule). They look good, are easy to attach and are adjustable. When the doors are attached, take them off again to make it easier to glue up the cabinet.

Cabinet: Dadoes and Nails

You're now ready to make the cabinet itself. All the cabinet pieces are made of solid lumber on this piece to keep it reproduction quality. The center shelf, top and bottom are fit into ¼"-deep by ¾"-wide dadoes in the sides. Use the diagrams to locate the dadoes. The sides of the cabinet have 3/8" x 1/2" rabbets run on the inside edges for the back. Cut the dadoes, then glue and nail the top, bottom and center shelf between the sides.

After assembling the case, lay it on its back and glue and clamp the face frame to the cabinet. Check for square, and make sure the overhang on the sides is even. When the glue is dry, I simply remove the clamps and use a flush-cutting router bit to trim the face frame flush to the sides. I used a ½" hardwood beaded shiplap back for this piece. The number of back slats is up to you. They can be random widths, or they can all be the same. I cut a ¼" x ½" rabbet on the slat sides, then add a ¼" bead on one edge using a beading bit in my router table. Don't attach the back yet, as it'll only make finishing more difficult. Set the pieces aside for now.

Shaker furniture is known for its lack of ornamentation, but the Shakers still had a sense of style. Style for this cabinet requires a crown moulding. Cut the moulding pieces to the sizes given in the materials list. Set your table saw blade to a 45° angle and bevel one long edge of the moulding piece. Then move to your jointer, adjust the fence to 45° and run the sharp bevel edge of the moulding over the jointer to leave ¼" flat on the moulding's edge. Repeat the entire process on the opposite edge.

Fit and cut the crown pieces to length, then glue and nail them to the case. On the side pieces I only glue the first 8" of the moulding and attach the back end with a screw through a slotted hole in the case. This allows the sides of the case to move during humidity changes without tearing the crown moulding off. I use small triangular glue blocks behind the crown moulding to support the crown. Next cut the ½" cap pieces to length, mitering them to overhang the crown by ¼", then attach them to the case as well.

A Simple Base

You're almost done. To give the case a base (and to make it sit on an uneven floor without rocking) I used a jigsaw to cut out a pattern on the bottom of the face frame and the sides of the piece, essentially leaving legs. Drill the holes for the shelf pins. Then cut slots for ventilation in the back pieces, and holes through the shelves to pass wires.

The next to last step was finishing. I used a coat of dark oak stain over the entire piece and then applied three coats of semi-gloss spray lacquer.

All that's left is the hardware. You can use whatever you find attractive. I used a couple of turned pulls and added a stop rail behind the doors (at the top of the cabinet). A couple of bullet catches and I was ready to deliver it to the customer. Of course it'll take them another two days to get all the equipment hooked up and arranged the way they want it

When you trim the doors to size, make sure you support the door adequately and start with the top and bottom edges. That way any tear-out on the end grain will be removed when you run the long-grain edges over the jointer.

After the face frame is glued to the cabinet, it's a simple step to walk around the case with a flush-cutting bit in your router to trim the frame flush to the cabinet. A little sanding and you're ready to move on.

To bevel the crown pieces, first bevel cut one edge (shown) with the table saw blade set at 45°. Then move to your joiner (also set at 45°) and put a ¼" flat at a right angle to your first bevel.

Head back to the saw to cut the second bevel. As you'll see in the photo, by cutting the return bevel on the first edge you've provided a bearing surface for the rip fence, rather than let the bevel slip under the fence, messing up the cut.

With one last pass on the joiner you’re ready to start hanging the crown.

To make sure the crown moulding is flush to the top of the cabinet, I temporarily screw two scrap strips to the top of the cabinet while I align the front piece. When the front piece is attached, it’s fairly easy to carry the height orientation around to the sides. Then simply remove the strips.

The last step on the crown is to attach the cap to the crown and cabinet. Notice the glue blocks behind the crown moulding to support the crown and add stability.

PICTURE FRAMES

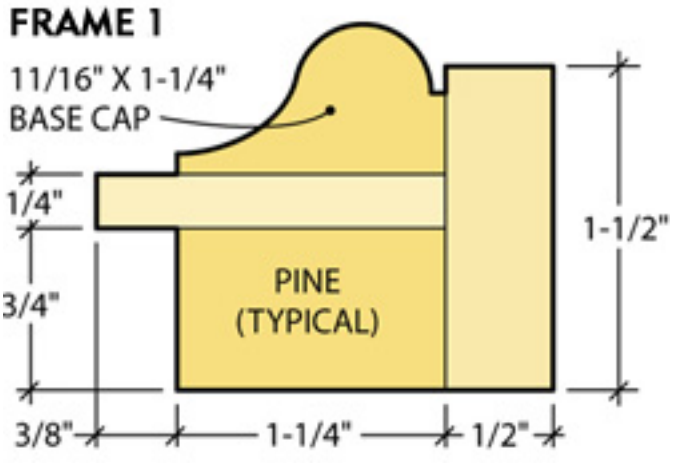
Painted Pine Frames

Our first two frames are made from pine and are great candidates for a paint finish. They feature standard moldings available at well-stocked home centers (below we give the molding's reference number in addition to its common name). For all the frames, it's best to cut the rough materials about 2 or 3 in. longer than necessary before ripping to width or machining.

Frame 1 uses base cap molding (No. WM 166) and flat pine stock. Rip four 3/4 x 1-1/4-in. pine pieces and glue lengths of 1/4 x 1-5/8-in. lath to each. Place them face to face with the edge of one piece flush with the adjoining piece. Use spring clamps to hold the assembly while the glue sets. Then, spread glue on the back of the molding and clamp it to the top of the lath (Photo 1). Make sure that the outer edge of the molding aligns with the flush edge of the flat-stock assembly.

Next, cut the four laminated frame members to size with a miter saw (Photo 2). Use a small brush to spread glue on the mitered ends and assemble the frame in a miter clamp (Photo 3). Check that all corner joints remain tight as you tighten the clamp. After the glue has cured, remove the frame from the clamp and drive small brads into the corners to reinforce the joints.

Next, rip pieces of 1 x 2 to 1/2 in. thick and miter them to fit around the perimeter of the frame. Apply glue and clamp them to the frame with spring clamps (Photo 4).



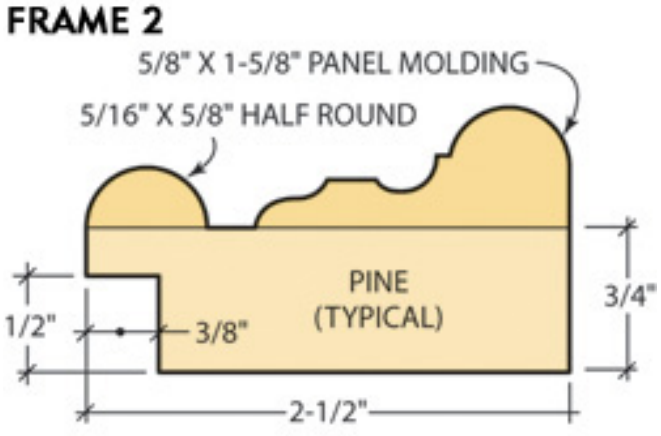
After gluing a 1/4-in.-thick lath to a 3/4-in. backer, add the molding to the lath. Use spring clamps to apply pressure.

Use a miter saw to make the 45° cuts at both ends of each piece. Make sure opposite pieces are the same length.

Spread glue on the mating surfaces and assemble the sides in a frame clamp. Use brads to strengthen joints.

Cut banding strips of 1/2 x 1-1/2-in. pine to length with mitered ends. Glue these to the outside of the frame.

Frame 2 features a panel molding (No. WM 8174) and a 5/8-in. half round (No. WM 123), glued to 1 x 3 pine. After cutting the stock to rough length, spread glue on the back of the molding and use spring clamps to hold it to the 1 x 3 until the glue sets. Keep the panel molding flush to one edge and the half round flush to the opposite edge. When the glue is dry, use a dado blade in your table saw to cut the rabbet along the inner edge of the 1 x 3 (Photo 5). Then, miter the frame stock to exact length.



Since this frame is wider than the first, you can use No. 0 joining plates to reinforce the corners and eliminate the need for brads. Mark centerlines for the plate slots in the mitered ends of the frame stock and cut the

slots (Photo 6). Spread glue on the mitered faces, in the plate slots and on the plates, and assemble the pieces in the frame clamp to pull the corners tight. After about 20 minutes, use a small chisel or putty knife to remove any glue that has squeezed from the joints.

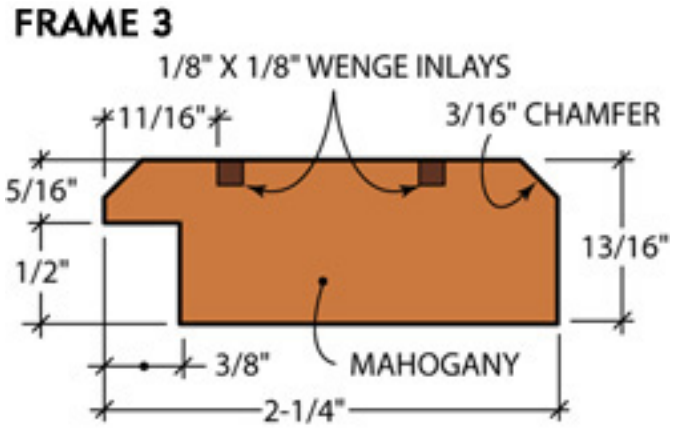
To finish these painted frames, first lightly sand with 150- and 220-grit sandpaper. Then apply an aerosol spray finish, following the manufacturer's instructions. We used Rust-Oleum Hammered Gold (No. 7210) and Hammered Silver (No. 7213) for our frames.

Frame 2 uses two moldings glued to 1 x 3 stock. Cut the frame rabbet with a dado blade and table saw.

Reinforce the corners of wider frames with plate joints. Mark the centerlines and cut slots for No. 0 plates.

Hardwood Frames

Another approach to building frames is to use hardwood with either a clear or stained finish. In each of the following designs, we've combined different woods to create patterns of contrasting colors and textures. After building four oversize pieces of frame stock for each design, use a dado blade or router table to cut the 3/8-in.-wide frame rabbet on the inner edge of each piece. Then, use a miter saw to cut the pieces to precise length and join the corners with plate joints.



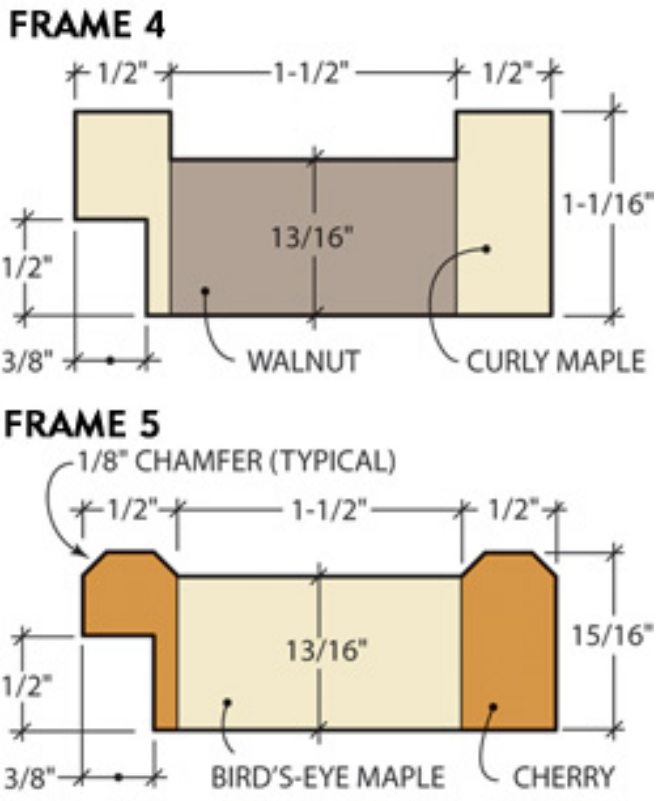
Frame 3 is constructed of mahogany with wenge inlay. Begin by ripping 13/16-in. mahogany to 2-1/4 in. wide. Crosscut the stock to rough length, then readjust the saw blade and cut two 1/8-in.-deep kerfs in the face of each piece. Use a band saw to rip 1/8 x 1/4-in. inlay strips of wenge. Run a bead of glue into each saw kerf and press the inlay

strips into place. Use spring clamps to hold them while the glue cures (Photo 7). When the glue is dry, use a plane or sharp cabinet scraper to trim the wenge flush to the mahogany surface. Then, install a chamfer bit in your router table and bevel the two top edges of the frame stock.

Frame 3 has two inlaid strips. Cut the slots on a table saw. Glue the strips in place and rout a chamfer on the edges.

Frames 4 and 5 are variations on the same theme. For the first design, rip curly maple strips to 1/2 x 1-1/16 in. and glue them to the edges of a 13/16 x 1-1/2-in. walnut field (Photo 8). Keep all pieces flush on the back side of the frame.

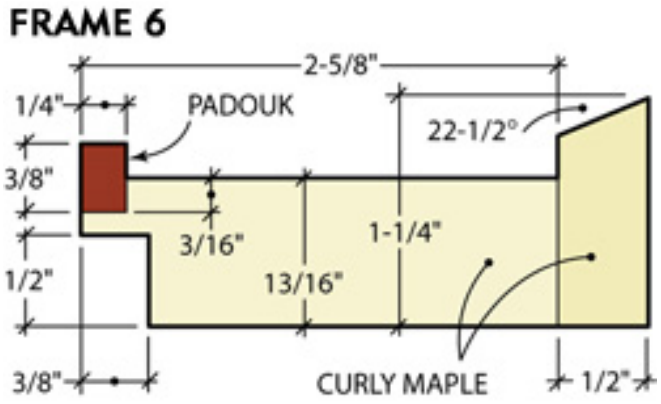
For the second variation, rip 1/2-in.-thick cherry stock to 2-1/2 in. wide. Use a router table with a chamfer bit to shape all four edges of the cherry, then rip the molded stock into 15/16-in. strips (Photo 9). Glue these strips to both edges of a bird's-eye maple field.



Clamp maple strips to both edges of a walnut field to form Frame 4. Make sure the pieces are flush on the back.

After routing chamfered edges on cherry stock, rip two strips. Glue them to the edges of a maple field for Frame 5.

For Frame 6, we've chosen curly maple for the field and raised outer band, with a padauk inlay that accents the inner edge. After ripping the maple stock to width, use a dado blade or router table to cut a 3/16-in.-deep x 1/4-in.-wide rabbet along one edge of each of the four frame pieces. Then, cut pieces of padauk to fit the rabbet in each piece. Glue the inlays in place, securing them with strips of masking tape until the glue sets (Photo 10).



To make the outer band, rip a 22-1/2° angle on the edge of a 1/2-in.-thick piece of maple. Re-adjust your saw to 90° and rip this beveled strip from the board. With four band strips made, glue each to the outer edge of the maple field pieces (Photo 11).

After sanding to 220 grit, we finished our

hardwood frames with clear shellac. This finish is easy to apply, it dries quickly, and it won't react with delicate artwork and mounting materials. Brush on a light coat with a good-quality bristle brush and let dry for at least 2 hours. Lightly sand with 320-grit paper to remove any roughness, and dust off. Apply one or two additional coats as needed. When the last coat is dry, rub it with 4/0 steel wool for a warm, satin gloss.

For Frame 6, glue padauk strips in a rabbet on the edge of a maple field. Use masking tape instead of clamps.

Glue the angled band strips to the outside of the maple frame pieces. Be sure that the strips are flush on the back.

Mounting Equipment

Now that you have your wooden frames ready, it's time to gather the materials for mounting. You can buy what you need at any well-stocked art supply store.

Photos and prints are typically mounted within a broad mat-board window that highlights the artwork. Mat board is available in a variety of colors and a few textures as well. Make sure to get acidfree, or archival, mat board to protect the artwork from deterioration. This same material can be used as the mounting board behind the artwork. You'll also need archival mounting tape. This tape is made of linen cloth and is activated by wetting its glued surface. Backing board, installed behind the mounting board to keep it flat, can be either stiff corrugated cardboard or foam core stock. After the backing board, you'll need kraft paper to act as a dust cover over the back of the frame--a glue stick is a convenient way to attach the paper to the frame.

Most artwork requires a pane of glass to protect it from dirt and changes in humidity. In most cases, normal window glass will work, although a special ultraviolet-protective glass is available to help prevent fading. Nonglare glass is also used for framing. However, this type has a slightly dull appearance. Acrylic sheet can be a practical alternative to glass--especially if weight is an issue. But acrylic scratches easily, attracts dust and doesn't have the same degree of transparency as glass.

As for special tools, you'll need a straightedge and a mat cutter. Mat cutters come in a variety of configurations, ranging from basic $15 models to professional versions costing a few hundred dollars. We achieved good results with a medium-priced Logan Model 3000 Pro-Am mat cutter and Adapt-A-Rule straightedge and ruler.

Mounting The Artwork

Measure and mark the size of your mat and mounting boards. It's best to work from the back of the boards to prevent soiling the face. Place the boards on a piece of scrap cardboard and use a utility knife and straightedge to cut both pieces to size.

Position the artwork on the mounting board and mark the corners with light pencil marks. Rip two 1-1/2-in.-long pieces of linen mounting tape and moisten about 1/2-in. of each piece. Adhere the tape to the back side of the artwork, along the top edge so that about 1 in. extends beyond the top. When the glue dries, turn the piece face side up and position it on the mounting board. Rip two more strips of tape, each about 3 in. long, and moisten them. Apply them across the extending tape strips so the artwork is hinged to the mounting board (Photo 12). This system allows the print to expand and contract with changes in humidity, without wrinkling.

Use linen tape to attach photos and prints to the mounting board. Hinge the artwork at the top edge.

Mark the cutlines for the opening, or window, on the back side of the mat board. Typically, a mat extends over the image by no more than 1/4 in. on each edge. Use the straightedge and mat cutter to make the cuts (Photo 13). It's a good idea to practice on scrap board to learn how to start and stop the cuts exactly at the corners.

To cut the mat opening, mark cutlines on the back side of the mat board and use a mat cutter to make the cuts.

Place the cut mat over the mounted print (Photo 14). It's not necessary to attach the mat since the whole assembly will be sandwiched in the frame.

Place the mat over the print and mounting board. It's not necessary to fasten the two boards together.

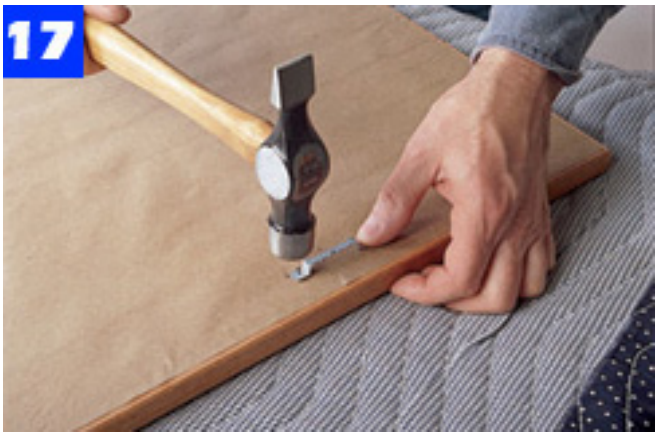
Turn the frame upside down and install the glass. Then place the matted print into the frame (Photo 15). Cut the backing board to size and place it over the mounting board. Use framer's points to hold the back in place (Photo 16). You can use a special driving tool or a flat-blade screwdriver to install the points. On hardwood frames, the driving tool is worthwhile since the points are a bit harder to install.

Cut a piece of kraft paper slightly larger than the overall frame size. Rub a glue stick on the back side of the frame and apply the paper, letting it overhang on all edges. Press the paper to the frame to get a good bond and use a straightedge and utility knife to trim it 1/8 in. in from each edge. The simplest method of hanging a frame is to use a sawtooth-type hanger. Center the hanger on the back of the top rail of the frame and drive brads to hold it in place (Photo 17). On a hardwood frame, use an awl or bore small pilot holes for the brads.

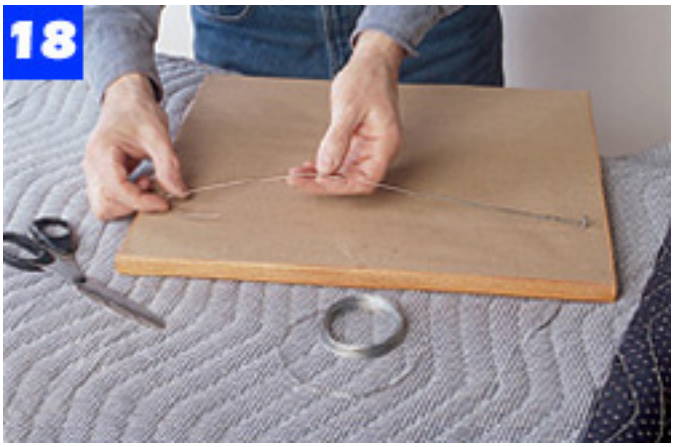
Large or heavy frames are best hung with picture wire. Bore pilot holes, and install screweyes or D-ring hangers in the side frame rails about 3 or 4 in. from the top edge of the frame. String a length of picture wire between the hangers, leaving about 1-1/2 in. of slack. Twist the wire together to lock it to the hangers (Photo 18).

With the frame lying face side down, install the glass panel. Then, place the mounted artwork in the frame.

Place a corrugated or rigid foam backing board over the mounting board and hold it in place with framer's points.



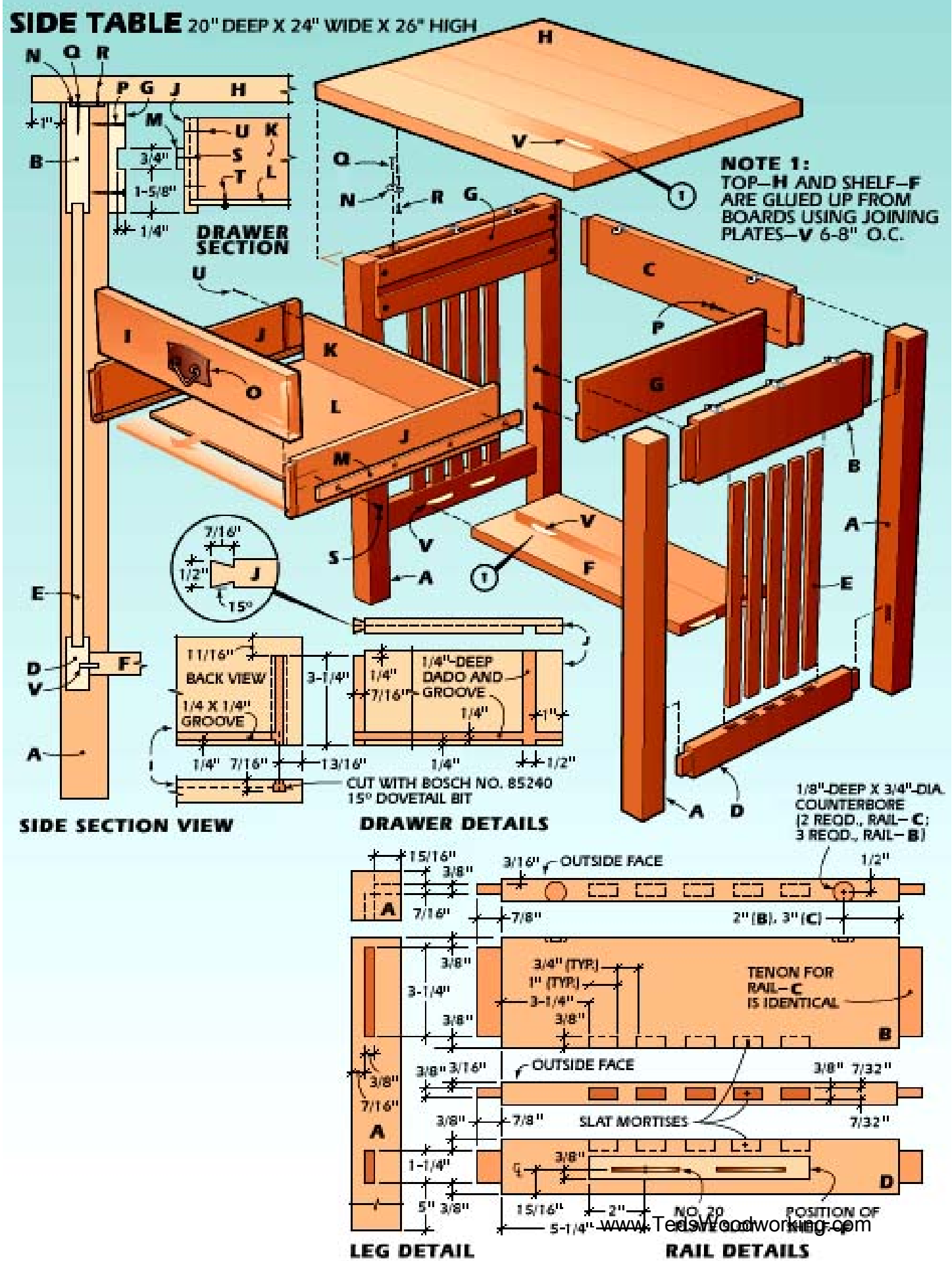
A sawtooth hanger is fine for supporting light frames. Use brads to secure it to the center of the frame.



Hang heavy frames with picture wire. Install screweyes or D-ring hangers and string picture wire between them.

SIDE TABLE

SIDE TABLE 20" DEEP X 24" WIDE X 26" HIGH



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MATERIALS LIST–SIDE TABLE		
Key	**No.**	**Size and description (use)**
A	**4**	**1 3/4 x 1 3/4 x 25" oak (leg)**
B	**2**	**13/16 x 4 x16 1/4" oak (rail)**
C	**1**	**13/16 x 4 x 20 1/4" oak (rail)**
D	**2**	**13/16 x 2 x 16 1/4" oak (rail)**
E	**10**	**3/8 x 1 x 15 1/8" oak (slat)**
F	**1**	**13/16 x 8 x 19 7/8" oak (shelf)**
G	**2**	**5/8 x 4 x 15 7/8" oak (drawer guide)**
H	**1**	**1 x 20 x 24" oak (top)**
I	**1**	**13/16 x 3 15/16 x 18 3/8" oak (drawer face)**
J	**2**	**1/2 x 3 1/2 x 16 1/4" oak (drawer side)**
K	**1**	**1/2 x 3 x 16 3/4" oak (drawer back)**
L	**1**	**1/4 x 15 1/16 x 16 3/4" oak plywood (drawer bottom)**
M	**2**	**1/4 x 3/4 x 15 13/16" oak (drawer guide strip)**
N	**8**	**Knape & Vogt No. 1547STL tabletop fastener**
O	**1**	**Whitechapel No. 106STH2 drawer pull**
P	**8**	**1 1/4" No. 8 fh screws**
Q	**8**	**1" No. 8 fh screws**
R	**8**	**5/8" No. 8 fh screws**
S	**8**	**1/2" No. 6 fh screws**
T	**3**	**5/8" No. 6 rh screws**
U	**8**	**3/4" x 16-ga. brads**
V	**16**	**No. 20 joining plates**
Misc: Yellow glue, 120- and 220-grit sandpaper, 0000 steel wool, aniline stain, tung oil varnish, paste wax.		

Stock preparation

Like the rocker and bookcase, the material used in this table is quarter- sawn white oak. The legs are cut from 8/4 solid stock, the top from 5/4 material and the rest from 4/4 lumber. For the drawer sides, you will have to either plane 4/4 stock to 1/2-in. thickness or have your lumber dealer plane the lumber to the finished size. The same holds true for the drawer guides, which are 5/8 in. thick.

The panels for the bottom shelf and tabletop are glued up from narrow boards. Cut stock slightly longer and a bit wider than required to yield the finished panel. Edge-joint each piece, then lay out the locations of the No. 20 joining plate slots every 6 to 8 in. along the mating edges. Keep the end slots about 3 in. from the finished ends of the panels.

Use the plate joiner to cut the slots, registering the cuts against a flat work surface. Then apply glue to the slots, plates and edges and assemble the panels. Use clamps to pull the joints tight, then let the glue set for about 20 minutes. After the glue fully cures, rip and crosscut the panels to finished dimension.

Joinery

Rip and crosscut the remaining parts for the table base to finished dimension. Then, lay out the mortise in the table legs. Use a router with an edge guide and 1/2-in.-dia. up-cut spiral bit to make these cuts (Photo 1). Use a sharp chisel to square the ends of each mortise (Photo 2).

Use a dado blade in your table saw to cut the tenons on the side and back rails. Since the tenons are 7/8 in. long, you will have to make two passes for each tenon cheek. Readjust the blade height to cut the shoulders at the top and bottom edges of the tenons (Photo 3). Check the fit of each tenon in its matching mortise.

Mark the locations of the slat mortises in the side rails. Clamp a tall fence to the drill-press table to help locate the rails, then bore overlapping 3/8-in.-dia. holes to remove most of the waste (Photo 4). Complete the mortises by smoothing the walls and squaring the ends with a sharp chisel.

1--Use a router with an up-cut spiral bit and an edge guide to cut the rail mortises in the table legs. Make several passes.

2--When the routing is done, carefully square the ends and flatten the sides of each mortise with a sharp chisel.

3--Use a dado blade in a table saw to cut the rail tenons. First cut the cheeks, then readjust the saw to cut the shoulders.

4--Cut the slat mortises in the rails using a drill press to remove most of the waste and a sharp chisel to finish the cuts.

Lay out the joining plate slots on the bottom shelf and side rails. Use the plate joiner to cut the slots in the shelf ends, registering the cut on a flat workbench or on the top of your table saw (Photo 5). To cut the slots in the side rails, you must use a spacer block under the plate joiner to yield the proper slot position (Photo 6).

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Before beginning to assemble the base, sand all the parts with 120- and 220-grit sandpaper, then dust off the pieces thoroughly. It is much easier to do a good job of sanding at this stage than it is once the base is together.

Base assembly

Position the side slats in their mortises in one bottom side rail (Photo 7). If the parts fit properly, you need not apply glue to these joints, since the slats will be held captive between the rails. Place the top side rail over the slat ends, then clamp the assembly temporarily to be sure that the slats

are completely seated in the mortises.

Apply glue to the rail tenons and leg mortises, then assemble the table side. Clamp the joints tight, then compare opposite diagonal measurements to be sure that the assembly is square (Photo 8). Follow the same procedure for the other side. Apply glue to the joining plate slots, mortises, tenons and plates for assembling the shelf and back rail to the sides. Join the rail and shelf to one side (Photo 9), then place the opposite side over the shelf and rail ends. Stand the base on a flat work surface and clamp the joints tight (Photo 10). Check for square.

Use a router with an edge guide to cut a 1/4-in.-deep x 3/4-in.-wide dado in each drawer guide (Photo 11). Bore and countersink pilot holes for mounting screws in the guides, then sand the guides with 220-grit sandpaper before fastening them to the table legs (Photo 12).

5--Clamp the bottom shelf securely to a workbench. Then use a plate joiner to cut joining slots in both ends of the shelf.

6--Clamp the bottom rails to your table saw fence. Then use a plate joiner to cut joining slots in one side of both rails.

7--Test fit the side slats in the rail mortises. Sand or trim the joints, if necessary, to achieve a tight fit for each slat.

8--Apply glue to the mortises and tenons, then clamp the parts. Check for square by comparing diagonal measurements.

9--To join the sides to the back rail and bottom shelf, apply glue to the slots and plates, and to the mortises and tenons.

10--Clamp the side assemblies to the back rail and shelf and check the parts for square. Readjust the clamps if necessary.

Mark the locations of the tabletop fasteners on the top edge of the side and back rails. Use a 3/4-in. Forstner or multispur bit to bore the 1/8-in.-deep recess for the fasteners. Bore a pilot hole for each, then attach the fasteners with 1-in.-long No. 8 fh screws.

Drawers

Cut stock to finished size for the drawer sides and back, and rip stock for the drawer face, but don't cut it to length yet. Instead, leave the drawer face blank about 12 in. long. The drawer sides are joined to the face with sliding dovetails. These joints are not difficult to cut, and they provide a nice compromise when you do not want to invest the time required for traditional dovetail corner joints. In order to cut these stopped dovetail slots, construct a U-shaped jig to guide the router. You can build this jig by screwing together three strips of scrap lumber or plywood. The dimensions of these pieces are not critical. But it is important that the three pieces are assembled square to each other.

Set the dovetail bit–we used a Bosch No. 85240–to cut 7/16 in. deep, then make an indexing cut into the fence of your jig to make locating your cut easy. Mark the position of the two slots–along with an end mark for each slot–on the inside surface of the drawer face, centered on the length of the face blank. Clamp the face to the routing jig with the indexing cut centered on one mark. Slide the router bit into the slot, turn on the motor and guide the tool along the jig to the end mark of the slot (Photo 13). Turn off the router and slide the bit back to the indexing cut to remove it. Repeat for the other slot. Cut the face to finished length.

13--Rout slots in the drawer face for the drawer sides with a dovetail bit. Use a square U-shaped jig to guide the router.

Use the same dovetail bit in the router table to cut the dovetail shape on the ends of the drawer sides (Photo 14). For the joint with the drawer back, use a dado blade in the table saw to cut a simple dado. Then use a 1/4-in.-dia. straight bit in the router, and an edge guide, to cut the grooves for the drawer bottom in the face and drawer sides (Photo 15). Note that the groove in the face runs only between the dovetail slots.

14--Use the same dovetail bit in a router table to cut both sides of the dovetails on the ends of each drawer side.

Use a small backsaw to cut the shoulder at the top of the dovetail on each drawer side. Then dry assemble the drawer box to be sure that all joints fit properly. If all the joints are correct, sand all drawer parts, then apply glue and reassemble the drawer (Photo 16). Use brads to reinforce the glue joints between the back and drawer sides. Then clamp the drawer parts together. Check that the assembly is square.

Cut the drawer bottom from 1/4-in.-thick plywood, then slide it into place, and fasten it to the bottom edge of the drawer back with screws. You can remove the bottom later to make finishing the drawer easier.

Cut the drawer hanger strips to size, then bore and countersink pilot holes for attaching them to the drawer sides. Clamp the strips to the drawer sides, then fasten them with screws (Photo 17). Finish the drawer assembly by marking the locations of mounting screws for the drawer pull. Bore pilot holes and attach the pull.

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15--Cut a dado between the dovetail slots on the drawer face for the bottom panel. Cut matching dadoes in the drawer sides.

16--Apply glue to all the drawer joints, then clamp the box together. Reinforce the side-to-back joints with brads.

17--Slide the drawer bottom in place and attach it to the back with screws. Also, screw the guide strips to the sides.

18--Center the base over the top and mark the fastener holes. Then, drill pilot holes in the top and attach the base.

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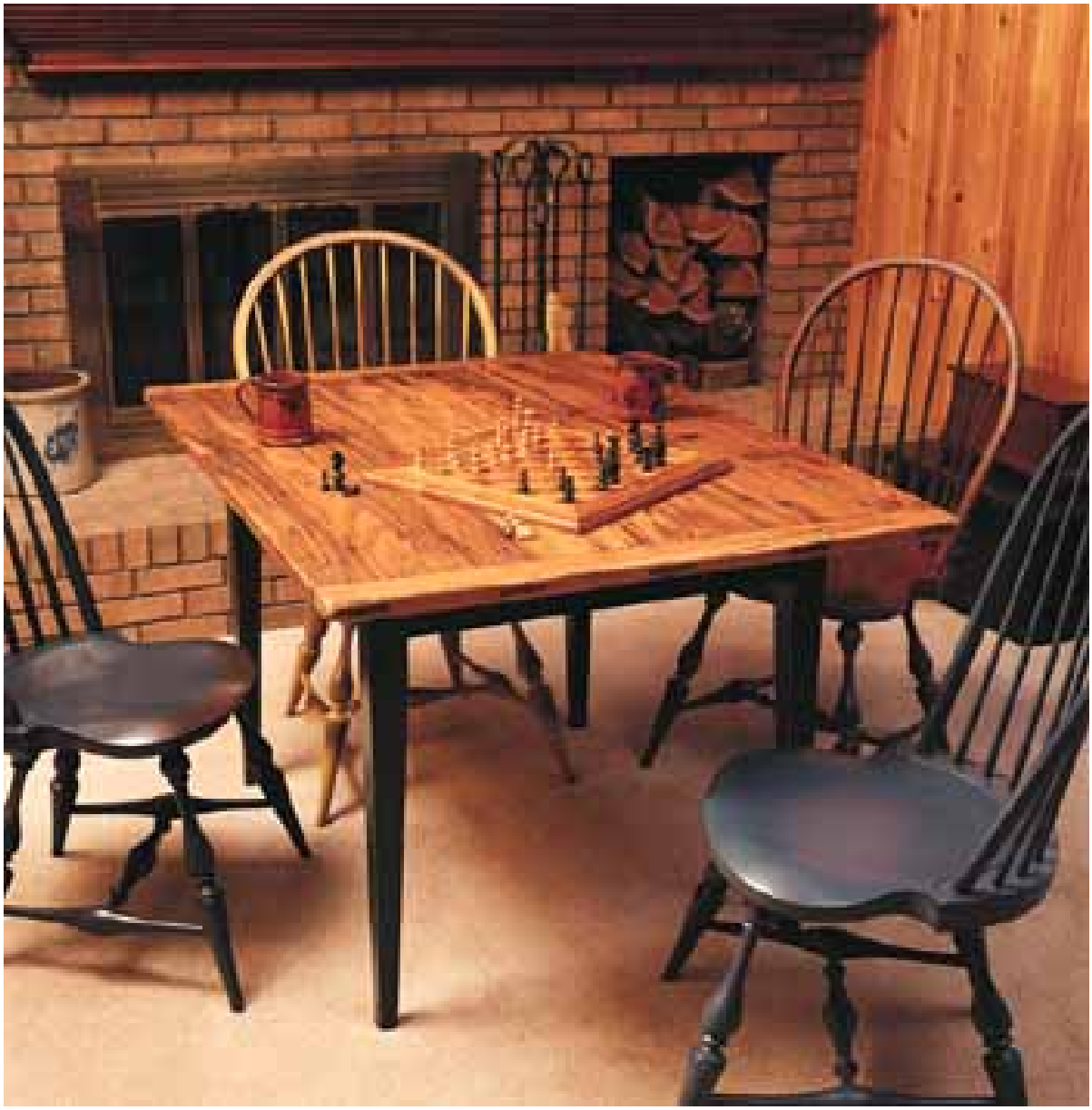
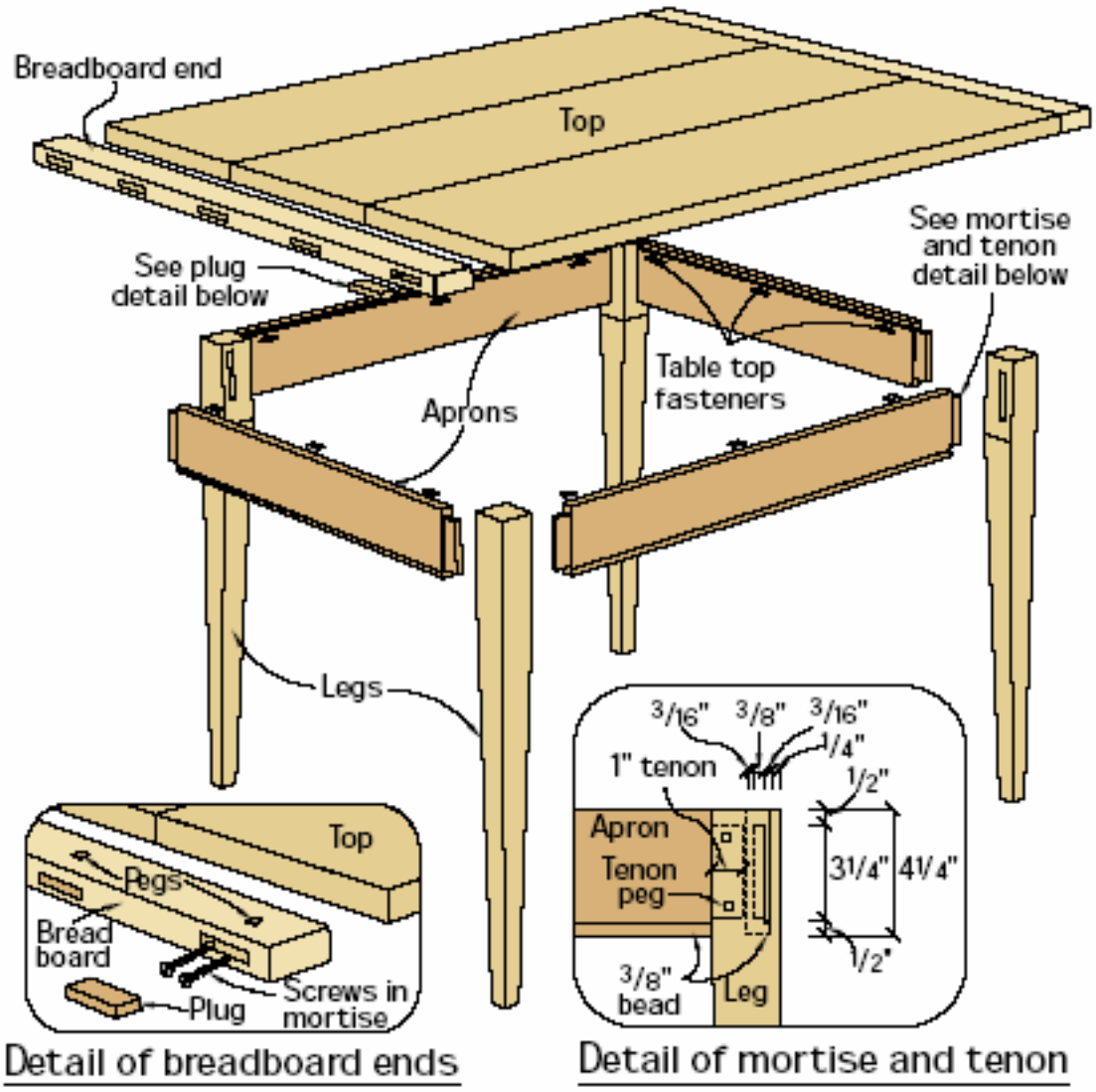
Assembly

Sand the tabletop smooth with 220-grit sandpaper, then place it upside down on a padded surface. Invert the base on the top and adjust it for an even reveal on all sides. Next, mark the locations of the screwholes for the tabletop fasteners (Photo 18). Use a clamp to maintain the proper spacing between the front table legs.

Remove the base from the top and bore pilot holes for the tabletop fastener screws. Then, replace the base and install the screws. You'll need a screwdriver with a magnetic tip to start the screws between the drawer guides and side rails. Apply the same stain and finish that's described in "Rocking Chair."

TAVERN TABLE





Detail of breadboard ends

Detail of mortise and tenon

Schedule of Materials: Tavern Table

No.	Item	Dimensions T W L	Material
4	Legs	2 1/8" x 2 1/8" x 28 1/4"	S
2	Aprons*	3/4" x 4 1/4" x 31 3/4"	S
2	Aprons*	3/4" x 4 1/4" x 25 3/4"	S
1	Top	1 1/8" x 36" x 43"	P
2	Breadboards	1 1/8" x 2 1/2" x 36"	P

P – chestnut; S–poplar • * Including 1" tenon

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Begin the project by milling the legs and cutting the taper. You can use a tapering jig for your table saw, but I don't recommend it. A few years ago I came up with a quick way to use a jointer to cut tapers faster and safer..

There are a lot of ways you can join the aprons to the legs, from totally traditional to quick-and-dirty. I prefer using a straight mortise-and-tenon joint, though if I were building a little side table or something else that wouldn't see daily abuse, the two less traditional methods I'm going to cover would work just fine. But before we talk about the bases, build the top.

Making the Top

After I pulled the right boards from my woodpile, I got them ready for glue-up. I wanted this top to look rustic, so I didn't plane the lumber. Instead, I jointed the edges of the planks and glued up the top. Then I rough sanded it with a belt sander to get it reasonably flat and to remove some of the milling marks. Then I cut the top to size and worked on the breadboard ends.

For a long time I used traditional through-mortises to attach breadboards to cover the end grain of my tabletops. Other people showed my how to do it with slotted screw holes. I was always against using that method until I actually tried it. Now it's the only way I'll attach breadboards. You actually get less up-and-down movement using screws, and the top stays flatter-looking for a longer time. Here's how I make my breadboard ends.

After cutting the breadboards to size, cut 3/8"-wide by 2-1/2"-long by 1-1/2"-deep mortises in the breadboards. I cut five of these for my 36"-wide top. How ever many you use, it's always good practice to use an odd number of mortises so it's easier to lay them out. I put the two outside mortises 1/2" in from the end of the breadboard.

Now cut two slots for two screws in each mortise. I make the slots about 3/8" long to give the top some real room to move if it has to. You can make a router jig to cut the slots, or you can use your drill press and work the bit back and forth. Clamp the breadboard to the table top and put two screws in each mortise. I put the screws at the sides of the mortise, not at the center. I do this because I peg the fake plug later in the process, and this keeps me from boring a hole into one of my screws accidentally. Don't drive the screws in too tightly because you want the table top to be able to move.

Now plug the mortises. I cut plugs to fit the opening and taper them a bit so they fit snugly when tapped in place. Glue the plugs in place, then peg the plugs through the top with 1/4" x 1/4" square pegs.

Now age the top. I strike the top with a key ring full of keys; I even write people's names in the top with a knife. It's pretty amusing to watch people as they see me do this. They freak out.

Stain the top with a golden oak color and then add a natural oil finish, such as Watco, which is an oil/varnish blend. You don't want the top to look too shiny.

Now plug the mortises. I cut plugs to fit the opening and taper them a bit so they fit snugly when tapped in place. Glue the plugs in place, then peg the plugs through the top with 1/4" x 1/4" square pegs.

Now turn your attention to the base.

Mortise and Tenon

Cut your aprons to size. Cut 1"-long tenons that are 3/8" thick. The apron lengths in the Schedule of Materials include the tenons. I cut my tenons first and use them to lay out my mortises, which results in less layout, in my opinion. These aprons are set back 1/4" from the front of the legs, this is called a "set back."

Now cut a bead on the bottom edge of the aprons using a beading bit in your router. Finally, cut a slot on the inside of the aprons for fastening the base to the top. I use metal

The plugs for the breadboard ends are made from the same material as the table top. Sand the plug to fit, put some glue on the sides and tap it in place.

I usually build my tables using straight mortise-and-tenon joinery. However, there are special cases when other methods are just as good or even better.

These table top fasteners are cheap ($1.99 for a pack of eight) and sturdy. Simply place the clip end into the kerf in your apron and screw the other end to your table top.

tabletop fasteners from Rockler (see the supplies list at the end of the article). Rockler sells very sturdy ones, and I recommend them.

For these fasteners, the slot needs to be the width of your table saw's blade (between 1/8" or 1/16" wide) and 7/16" down from the top of the apron and 3/8" deep.

Glue up your base, peg the mortises through the legs and finish the base. I use square pegs in my legs. Drill a round hole through the leg and into the mortise. Then take a piece of square stock, whittle one end of it roundish, then pound it into the hole. It should convert your round hole into a square.

Mitered Mortise and Tenon

This method is similar to the straight mortise and tenon above, but you must miter the ends of the tenons because your mortises meet in the middle of the leg. Why would they meet? Well you might have a thinner leg, or your mortises might be back farther if you chose to use a larger set back.

When this is the case, I make a standard tenon and chop the end off at a 45-degree angle on my miter saw. You're not trying to match the two miters exactly (it will never show) so leave a little gap between the two tenons. If it's too tight, it could get you in trouble because the ends of the tenons will touch before the shoulders seat into the legs.

Pocket Screws

I wouldn't recommend this for a large table. If you're going to spend the money on the wood, you might as well do it right. But if you want to build a quick-and-dirty side table, this will work fine. Be sure to glue and screw this joint for added strength. It's important to keep the pieces tightly together as you screw the apron to the leg.

Corner Brackets

Corner brackets are a faster alternative to traditional joinery, but they aren't as sturdy. However, you can't beat them when you want to make a table that can be knocked down and stored away.

These measurements apply to the brackets from Rockler (see the supplies box at the end of the article). The first step to installing these brackets is to cut a bevel on the inside corner of the legs. This is where you'll later install the hanger bolts. The best way to cut the bevel is on your jointer. Set the machine's fence to a 45-degree angle and the depth of cut to 1/4". Cut 3-1/2" in on the top corner as shown in the photo.

Now install the hanger bolts, which are odd-looking fasteners that have wood screw threads on one end and machine screw threads on the other. The wood screw end goes into the leg, and the machine screw end is bolted to the corner bracket. To install the hanger bolts, first lay out and drill pilot holes on the leg. Then install the bolts using the method shown in the photo.

Now you need to cut a kerf in each apron for the bracket to grab. The kerf should be 1-3/4" in from the end and 3/8" deep for these brackets. Different brands can use different measurements.

Attaching the Top and Finishing

I attach the top with tabletop fasteners that I screw in place about every foot. On the long aprons, don't push the fasteners all the way into the kerf when screwing them down. This will give your top some room to move.

I finished the base with a couple coats of latex paint followed by a glazing stain. Finally, I added a couple coats of lacquer for protection.

When you have to use mitered mortise-and-tenon joinery, don't get too worked up about the fit of the miter. You don't want the miter too tight.

Mitered mortise-and-tenon joinery is common on tables with thin legs or when your set back is deeper than normal.

Be sure to glue the joint and hold the leg and apron together tightly while screwing it together.

Pocket screws aren't my first choice for building dining tables, but for a small occasional table, it's quick.

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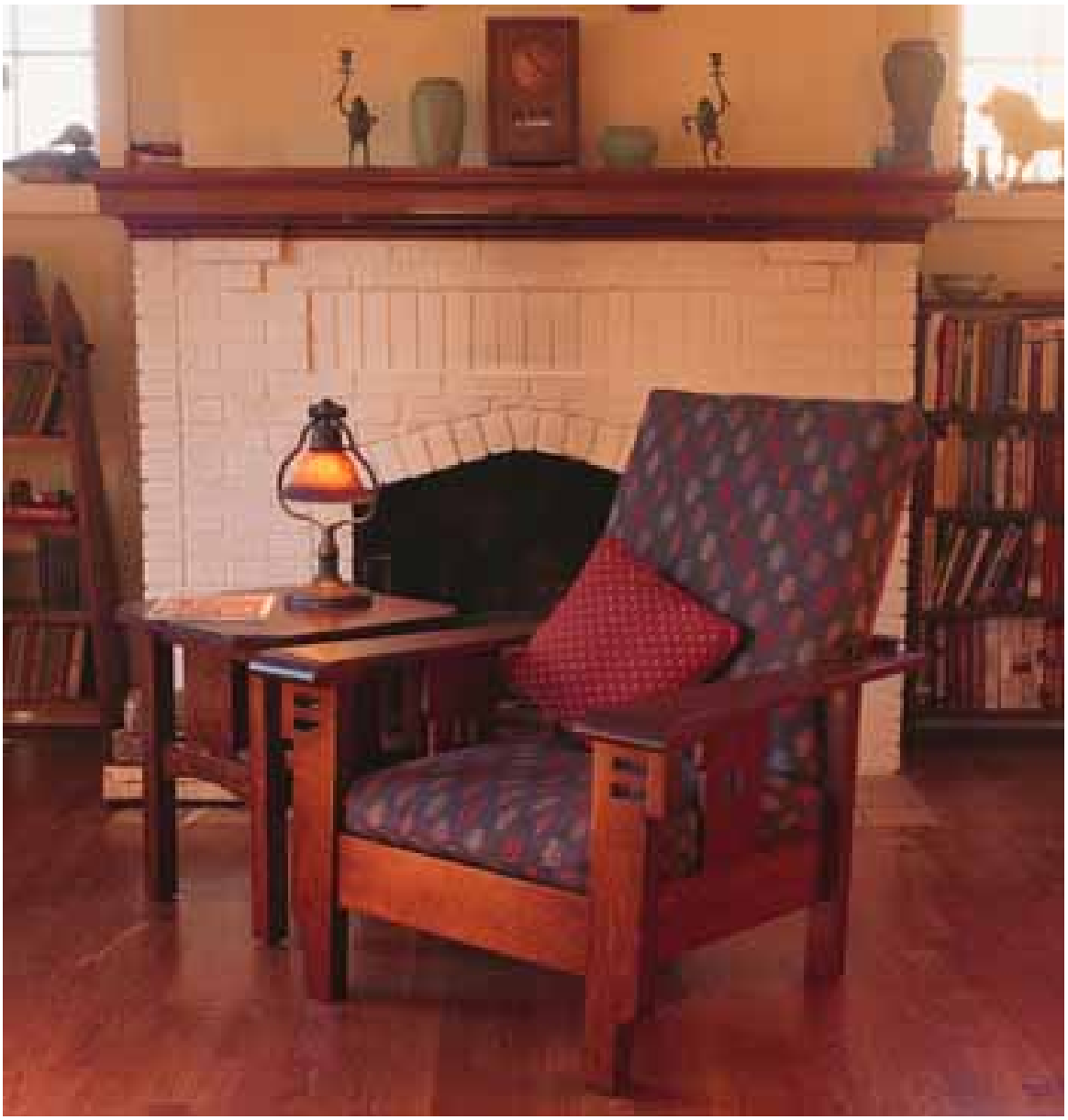
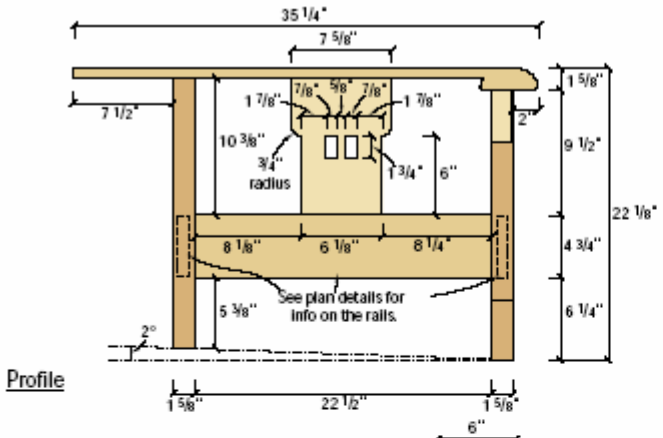
Use the bracket as a template for locating the holes for the corner bracket. Then use a drill press to make your pilot holes.

To install the hanger bolts, thread two machine nuts onto the end of the hanger bolt and tighten them against one another. Then grip the two nuts with a wrench and screw the hanger bolts into the leg.

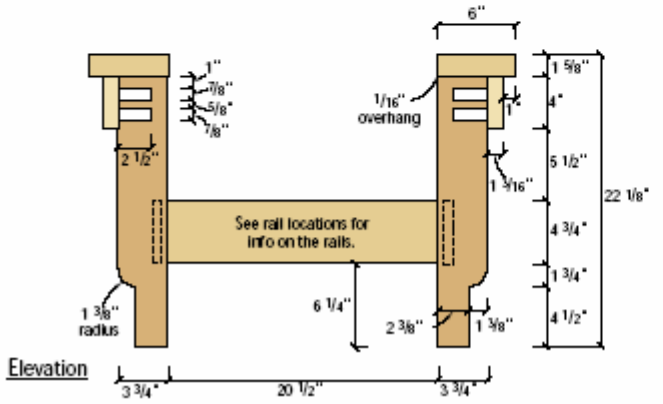
Corner brackets are great for building furniture that needs to be knocked down or moved frequently.

MORRIS CHAIR

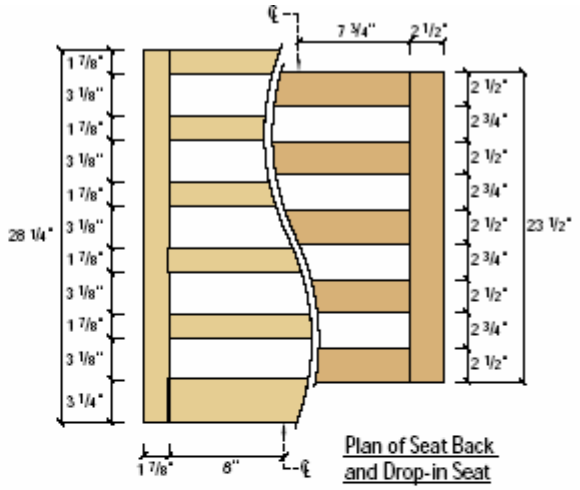




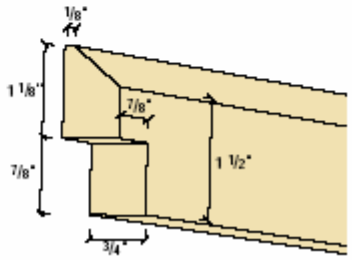
Profile



Elevation



Plan of Seat Back and Drop-in Seat



Back Rod

MORRIS CHAIR

	NO.	ITEM	DIMENSIONS (INCHES) T	W	L	NOTES
Chair frame						
❑	2	Front legs	1⅝	3¾	21	½" TOE
❑	2	Back legs	1⅝	2¼	21	½" TOE
❑	2	Applied sides	1⅝	1⅜	4	
❑	1	Front rail	¾	4¾	22	¾" TBE
❑	2	Side rails	¾	4¾	24	¾" TBE
❑	1	Back rail	¾	4¾	22	¾" TBE
❑	2	Side slats	½	7⅝	11⅜	½" TBE
❑	2	Arm blcks	⅞	6	4½	
❑	2	Arms	¾	6	35¼	
❑	2	Cleats	¾	1⅞	20½	
❑	1	Back rod	¾	2	23⅝	
Drop-in seat						
❑	2	Seat stiles	¾	2½	23½	
❑	5	Seat rails	¾	2½	17	¾" TBE
Adjustable back						
❑	2	Back stiles	¾	1⅞	28¾	
❑	5	Back rails	¾	1⅞	17½	¾" TBE
❑	1	Bottom rail	¾	3¼	17½	¾" TBE

TOE = tenon on one end • TBE = tenon on both ends

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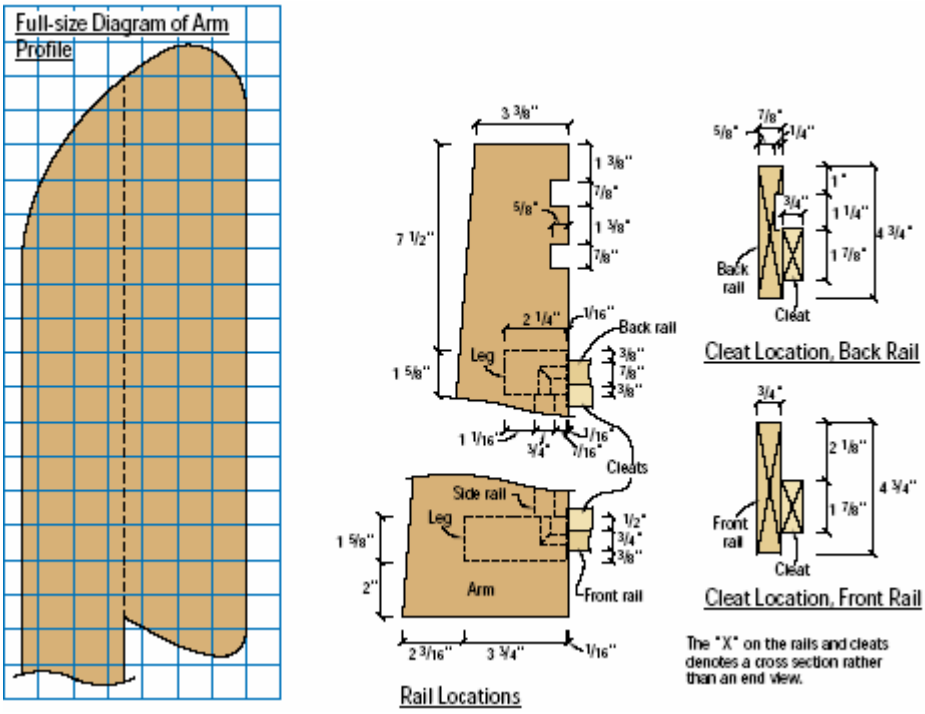


Mortises: Machine or No Machine?

First cut all your pieces to size according to the Schedule of Materials and begin laying out the locations of your mortises. The rule of thumb is that your mortises should be one half the thickness of your tenon's stock. When your stock is 3/4" thick, your mortises and tenons should be 3/8" thick. That means the tenons for the beefy back rail should be thicker (7/16") and those for the side slats should be thinner (1/4").

Make the mortises in the legs before you shape the curve near the bottom or make cutouts on the top.

Also remember that except for the tenons on the legs and slats, all the tenons are 3/4" long. To ensure your tenons don't bottom out in your mortises, it's always a good idea to make your mortises about 1/16" deeper than your tenons are long.

After you mark the locations of all the mortises, it's time cut them. There are 38 mortises in this project. You'd be nuts to do these all by hand. Use this project as an excuse to purchase a hollow chisel mortising machine (about $250) or a mortising attachment for your drill press (about $70). If you can't swing the cash, I'd make plywood templates and cut the mortises with a router and a pattern bit. Making plywood templates is something covered later in the story.

When pattern-routing the curve on the legs, make sure you have the work firmly clamped in place. I have the pattern and leg wedged between two pieces of oak (the pattern is on the underside of the leg). Then the leg itself is clamped to the table. You also could perform this operation on a router table with a starting pin for pattern-routing.

One more thing: don't cut the mortises in the arms or the arm buildups until the chair frame is assembled. You'll cut these with a router and a pattern bit after the chair frame is assembled.

Tenons With a Dado Stack

Once you get your mortises cut, make tenons that fit snugly into the mortises. You can use a tenoning jig or the fence on your table saw, or you can use a router. I prefer to use a dado stack and my miter gauge.

While your dado stack is in your saw, cut the groove in the back piece that holds the seat frame. See the drawing for the location of this groove.

Once you cut your tenons, prepare to assemble the drop-in seat and the adjustable back. To save yourself some grief, sand the edges of the rails that you won't be able to get to after the frames are assembled. Now put glue in all the mortises and clamp up the frames. Set them aside to dry.

Curves and Cutouts

What makes this Morris chair stand out are the curves and cutouts on the legs, arms and slats. Each curve and cutout needs a slightly different strategy.

The large curves on the legs and the small curves on the side slats were cut using a plywood template and a pattern-cutting bit in a router. I made the patterns from 1/2"-thick Baltic birch plywood. Use the drawings to make your own plywood template using a scroll saw, band saw or coping saw. Smooth all your cuts with sandpaper, then try shaping a couple scraps with your template to make sure your pattern produces the right shape. When satisfied, cut the curves to rough shape on your band saw (about 1/16" shy of your finished line) and clean up the cut with a router and pattern bit. Finish shaping the legs with a chisel.

To produce the large cutouts on the front legs, do what Oscar Onken did: cheat a bit. Make the "cutouts" using a dado stack on your table saw, with the legs on edge. Then glue the applied sides to the legs to cover the open end of the cuts. Instant cutout. While you're at it, cut out the notches on the arm pieces for the rod that adjusts the back.

To complete the legs, you need to cut the bottom of all four legs at a 2-degree angle so the chair sits flat on the floor. I recommend you make a full-sized mock up (see the photo above) so you can get the angle exactly right. Cut the angle on a chop saw.

Assembly

Now you're almost ready to assemble the chair frame. You'll need to first miter the tenons slightly where they meet to fit in the mortises using your table saw. Now finish sand everything. I went to 150 grit using my random-orbit sander and hand sanded the whole piece with 180 grit. Yes, it makes a noticeable difference.

Now glue the front rail between the front legs and the back rail between the back legs. Clamp and allow your glue to dry. Use 1/4" dowels to pin the tenons from the inside of the chair. This strengthens the weakest point of this chair. It's at this joint where the original chair came loose.

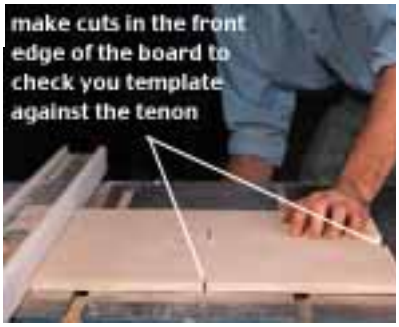
Glue the side rails between the front and back legs and you can see your chair take shape.

Learn to Make Square Templates

Now you need to work on the arms. First glue the arm buildup pieces to the front of the arms. Then get ready to cut the mortises on the arms that will hold the tenons on the legs and side slats. A word of advice here. Mock up an arm out of scrap wood and practice on it first.

To make plywood templates for the mortises, you need to make a square hole in the middle of a piece of ply. The best way to do this is by making plunge cuts into your plywood on your table saw. Refer to the photo earlier in the story to see how to do this.

Now cut your mortises. I used a template bit with cutters on the bottom and a guide bearing on top. If you don't have a bit with cutters on the bottom, you can still plunge with a straight bit. Just plunge slowly and wiggle the router a bit as you go. Cut the mortises in two passes.



3 To make a template for the mortises in the arms and the cutouts on the side slats, position your plywood over your table saw and raise the blade into the ply. Move the fence over and repeat. Then turn the pattern 90 degrees and repeat for the other edges of the pattern. Note that I made cuts in the front of the pattern to help me size the pattern to the tenons.

Be sure to make a full-size mock-up of the legs and sides to determine the angle you need to cut on the bottom of the legs.

When you determine that angle, use a grease pencil or magic marker to paint the bottom of the legs. I cut the back and front legs simultaneously. Slowly inch your legs in after each cut until the color is all gone.

Peg the tenons that join the front rail to the front legs and the back rail to the back legs. If you've ever pegged tenons before, you

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After you're sure the arms fit on the legs, cut the curve on the front of the arm. Attach the full-size pattern to your arm and cut the shape on a band saw. Clean up the cuts with a stationary belt sander. Now taper the arms with your band saw and clean up the cut with your jointer. Glue the arms and slats in place.

Now shape the back rod that adjusts the seat back angle. Bevel one edge of the rod on your jointer and cut notches on the ends so the rod fits between the arms. Attach the back to the seat frame with a piano hinge. Screw the cleats to the front and back of the frame in the locations shown in the diagram; slip the seat in place.

Finishing

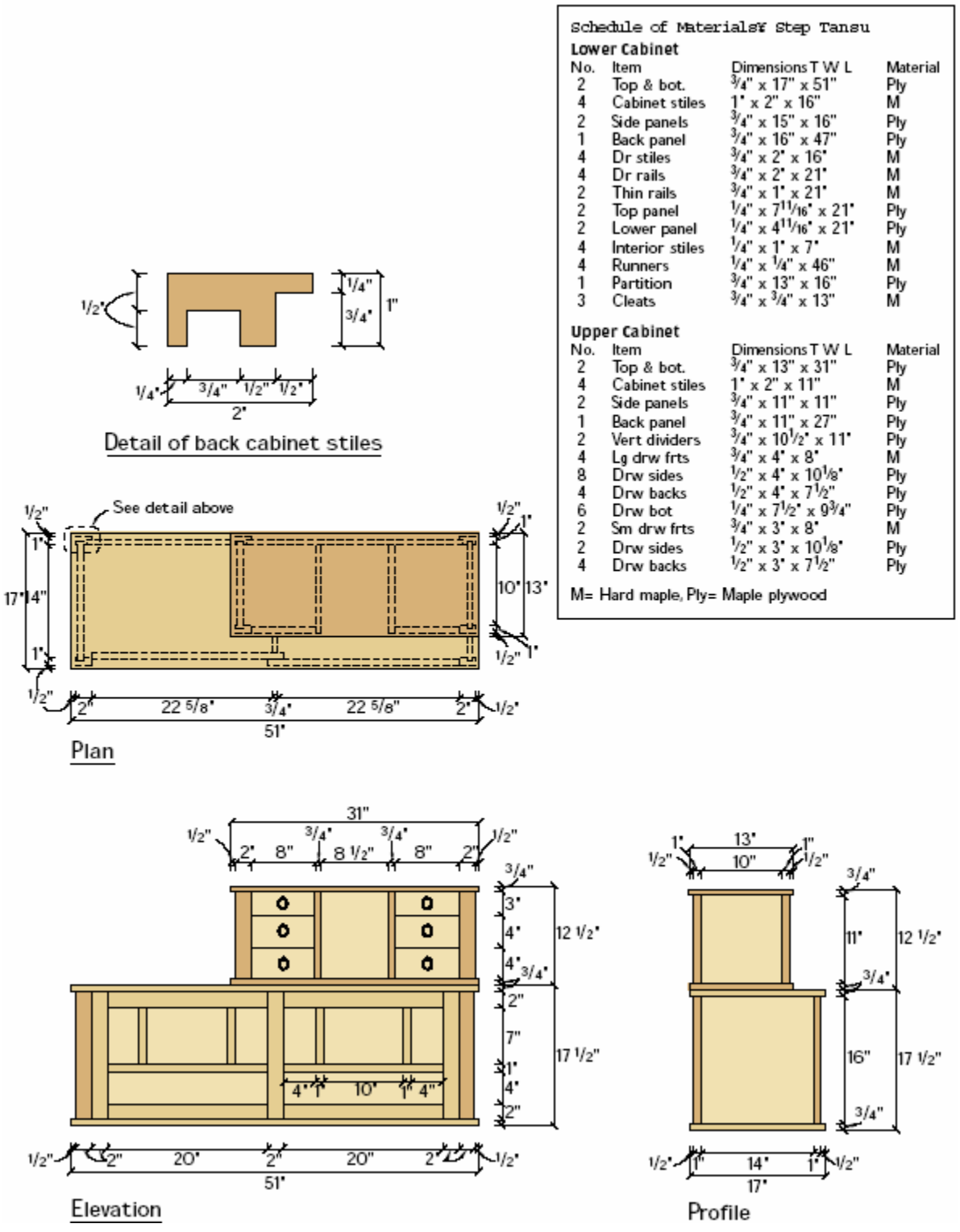
This takes some effort, but it is well worth it. The first step is to dye the chair with an alcohol-based aniline dye that's reddish. See the supplies list for ordering information. Then apply one coat of boiled linseed oil to the chair. You can get this at any home center store. Wipe off the excess and let it dry overnight. The linseed oil helps seal the wood before your final coloring step and helps bring out the ray flake.

Now wipe on a thin coat of Lilly's warm brown glaze. We live and die by this stuff when finishing Arts & Crafts furniture. We're not aware of a catalog that sells it, but you can visit Lilly's website (at the address in the supplies box) to find a paint store that carries this glaze. Wipe the glaze until you achieve an even tone. Allow it to dry overnight. Finally, apply three coats of a clear finish -- whatever you're comfortable with.

7 know that dowels can be wildly different sizes than they're supposed to be. Here's a trick. If your dowel is a bit undersized, glue it in place and cut it nearly flush to the surface. Then put several drops of thinned glue on the end grain of the dowel. It wicks in the glue, expands and glues up tight. When the glue is dry, cut the dowel flush.

Be sure to make a test arm before you go mortising the real thing. You'll be glad you did.

TANSU CHEST



Construction of this chest is simple. You'll need a sheet and a half of 3/4" maple plywood, one board of 1"-thick maple that's about 8' long and 8" wide and some 1/2" and 1/4" plywood scraps for the drawers. The carcases of the upper and lower cabinets are built the same way. First cut all your pieces to size and iron on veneer edge tape to cover all the exposed plywood edges.

Now cut the grooves and rabbets on the cabinet stiles. The side panels are glued into 1/2"-deep x 3/4"-wide grooves milled 1/4" in from the edge of the cabinet stiles. The back panel is nailed and glued into a 1/2"-deep x 3/4"-wide rabbet on the inside of the stiles. Screw each assembly to its bottom board. Glue and nail the partitions in place.

Lower Cabinet Doors

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Build the two sliding doors using stub tenons that rest in 1/4"-wide by 1/2"-deep grooves. The only exception to this is the grooves in

the thin rails, which should be 1/4" wide and 1/4" deep. Also, the interior stiles are merely applied to the doors after construction; they are not structural. After dry-assembling your doors, glue up and clamp them up.

When dry, glue the interior stiles in place and cut a 1/4"-wide by 1/2"-deep groove on the top and bottom of each door that will allow the door to slide on the runners. Then cut the four runners; make sure they slide smoothly in the doors' grooves. Attach the runners to the top and bottom of the lower cabinet using brads and glue.

I spaced my runners so that the front door is flush to the front edge of the cabinet stiles. Then I left a 1/16" gap between the two doors. Fit the doors to the opening in the chest. Now screw the top to the carcase through cleats that are screwed to the sides and partition of the case.

Upper Cabinet Drawers

Here's how I built my drawers. Cut 1/2" x 3/8" rabbets on the ends of the drawer fronts. Then cut 1/2" x 1/4" rabbets on the back edge of the sides to hold the back piece. Then cut a 1/4" x 1/4" groove to hold the drawer bottom on the sides, back and front that's 1/4" up from the bottom edge. Glue and nail the sides to the drawer front. Slip the bottom in place. Glue and nail the back to the sides.

How you hang the drawers is up to you. I cut 1/4"-deep x 5/8"-wide stopped dadoes that were centered on each side of the drawer. Then I nailed drawer runners to the carcase's partitions and drawer runners with plywood build-up strips to the sides. When the drawers move smoothly, nail the top to the case. Putty any nail holes. Apply three coats of a clear finish

You might have noticed from the photo that I made the grain direction of the drawers run vertically instead of horizontally. This is OK for such small drawers, and I did this because each bank of drawers now reminds me of one of those Japanese landscape paintings

STORAGE CABINET

SHAKER STORAGE CABINET

	NO.	LET.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL
Face Frame							
☐	2	A	Stiles	¾	2½	51¼	Poplar
☐	1	B	Top rail*	¾	2	45	Poplar
☐	1	C	Bottom rail*	¾	5½	45	Poplar
Doors							
☐	4	D	Stiles	¾	2½	43¾	Poplar
☐	6	E	Rails*	¾	2½	18½	Poplar
☐	4	F	Panels	⅝	17	18⅛	Poplar
Carcase							
☐	1	G	Top	¾	19	50	Maple
☐	2	H	Sides	¾	17¼	51¼	Poplar
☐	1	I	Bottom	¾	16¾	47	Poplar
☐	2	J	Dividers	¾	16¾	45½	Poplar
☐	1	K	Nailing strip	¾	1½	46½	Poplar
☐	1	L	Blocking 1	¾	2¾	45½	Poplar
☐	1	M	Blocking 2	½	1¾	45½	Poplar
☐	5	N	Adj. shelves	¾	16¾	22⅞	Poplar
☐	10	O	Masonite shelves	¼	16¾	20¼	Masonite
☐	1	P	Back	½	47	51¼	Ply

* = 1" tenon on both ends

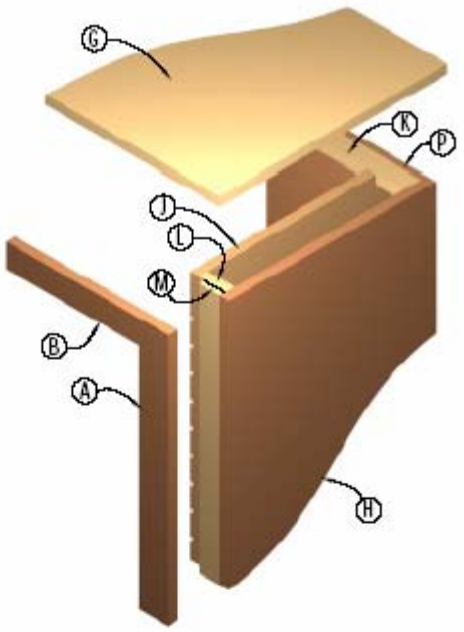
SUPPLIES

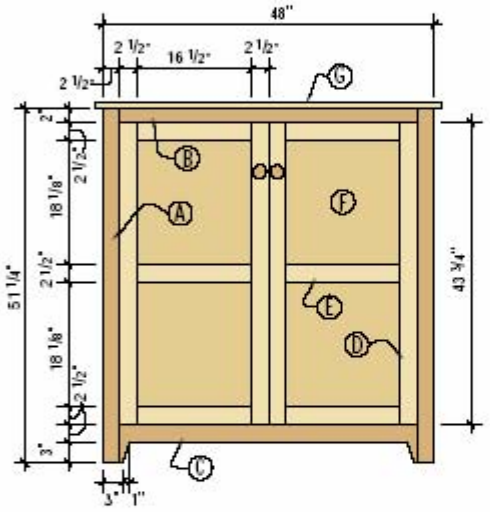
Woodworker's Supply
800-645-9292

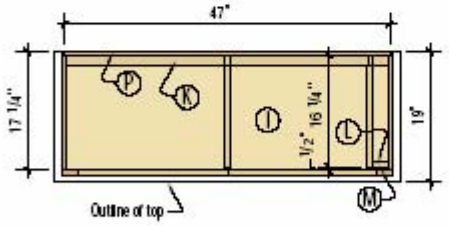
Amerock non-mortising hinges, #891-749, $2.95 each

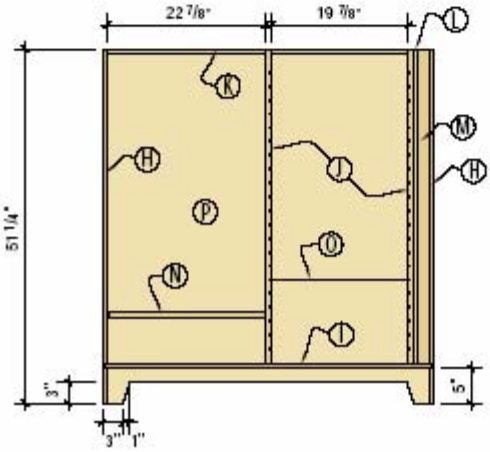
Horton Brasses
800-754-9127

Maple knobs, #MK-3, 1½" diameter, call for pricing









How to Pack Lots of Stuff Into Small Spaces

Organizing clutter is an interesting problem that you also might face as you design storage in your home or case pieces. Here's what I did: Behind the left door I put a series of five ¾"-thick adjustable solid-wood shelves. These would handle the heavier games and books. Behind the right door is a series of ¼"-thick tempered Masonite shelves. These 10 shelves slide in and out of 1/4" x ¼" dados.

The Masonite won't hold a lot of weight, but it's just right for storing lightweight objects. Think home office, and you'll know what I mean. Masonite (sometimes called "hardboard") shelves are perfect for storing letterhead, envelopes, CDs and any other paper goods in an office. The other challenge in this piece was getting the shelves, doors and face frame positioned so they didn't interfere with one another. As you'll see in the drawings, it took a few pieces of "blocking" to get everything to work in this cabinet.

Behind the left door are five 3/4"-thick adjustable solid-wood shelves, perfect for heavier games and books. Behind the right door are 10 1/4"-tempered Masonite shelves, perfect for storing letterhead, envelopes, CDs and other home-office related items.

Face Frame First

This seems backwards, I know, but begin construction by building the face frame. The size of the case and doors are determined by your face frame, so it's clearly the place to begin.

When ripping out the material for the face frame stiles, cut them each about 1/16" wider than the dimension called for in the cutting list. This will make your face frame hang over the edge of the case sides. Once the face frame is attached, you can trim it flush for a perfect fit.

I use mortise-and-tenon joinery to build both the face frames and doors. The tenons are 3/8" thick and 1" long, and I usually cut a 3/8" to ½" shoulder on the edges. Be sure to cut your mortises 1-1/16" deep so your tenons don't bottom out. When everything fits, put glue in the mortises, clamp the frame and allow the glue to cure.

I'm not perfect, and neither are you. If your face frame is exactly the width of your case, it's going to be difficult to fasten it square. Make life easier by ripping your stiles 1/16" oversize in width. After you nail and glue the face frame to the case, use a flush-trimming bit in your router to trim the face frame flush with the side of the cabinet's case.

Doors are Second

Next, build the doors. It's much easier to fit the doors into your face frame before it's attached to the case. Build the doors much like you did your face frame by using mortise-and-tenon joints. The only difference is that you need to cut a 3/8" x 3/8" groove in the rails and stiles to hold the door panels.

I cut my grooves along the entire length of the stiles; as a result, I cut my tenons with a "haunch" to fill in that extra space on the ends of the stiles. The panels are flat on the front, and beveled on the backside so they fit in the grooves in the rails and stiles. I cut that bevel by setting my table saw blade to 7° and slicing off a little of the backside of each door until the panels fit snug and without rattling.

Sand the panels up to your final grit (120 will be fine for a painted piece) and assemble the doors. Sand the assembled doors and face frame and then peg the tenons if you like. I used square pegs that I pounded into round holes.

Finally, the Case

The case goes together quickly thanks to my nail gun. Begin construction by cutting a ¾"-wide by ¼"-deep dado in the side pieces for the bottom of the cabinet. I like to use a dado stack in my table saw for this operation. Now cut a ½" x ½" rabbet on the back edges of the sides to hold the plywood back in place. Sand the inside of the case and get ready for the first bit of assembly.

Put the case together on its back. First put glue in the dados in the sides and fit the bottom in there. Nail the bottom in place from the outside of the case. I use a finish nailer for this task.

Now put the nailing strip in place at the top of the case. The diagrams show you where this needs to be, but essentially it's flush with both the rabbets in the sides and top of the case. Nail it home. Glue and nail the face frame to the case using brads. Trim the face frame flush

to the case.

All the Insides

There's nothing complicated about the insides once you have a plan. Begin by cutting the ¼" x ¼" dados in the dividers. These are spaced 2" apart, and there are 21 of them. I used a dado stack in my table saw and simply moved the fence 1-¾" after each pass.

Now it's time to add the dividers to the case. Turn the case on its head. Cut a notch in each divider so it will fit around the nailing strip. Get the divider right where it needs to be and nail it in place through the bottom and the nailing strip. Now nail the two blocking pieces shown on the diagram in place. The blocking does a couple things. First, it allows the Masonite shelves to be slid in and out without having to swing the doors wide open. Second, the thinner piece of blocking fills in the gap between the divider and face frame and leaves room for the hinges.

Now drill the holes in the left side of the case and the center divider for the adjustable solid-wood shelves. I'm partial to 5 mm holes spaced 1-3/8" on center.

Mark the base cutouts on the sides, front and plywood back of the case using the diagrams as a guide. Use a jigsaw to make these cuts and clean up your work with sandpaper.

Cut your top to size. I used a piece of bird's-eye maple. You have a couple options for attaching the top. You could use pocket holes, figure-8 fasteners or wooden cleats. No matter which way you go, prepare the case for the top but don't attach it. I like to glue the top to the front edge of the case after finishing.

Finishing

On the knobs, top and all the inside pieces (except the Masonite), I wiped on a light honey-colored stain. Then I painted the case a dark red and added a topcoat of lacquer to protect the paint. Hang the doors, nail in the back and add the knobs.

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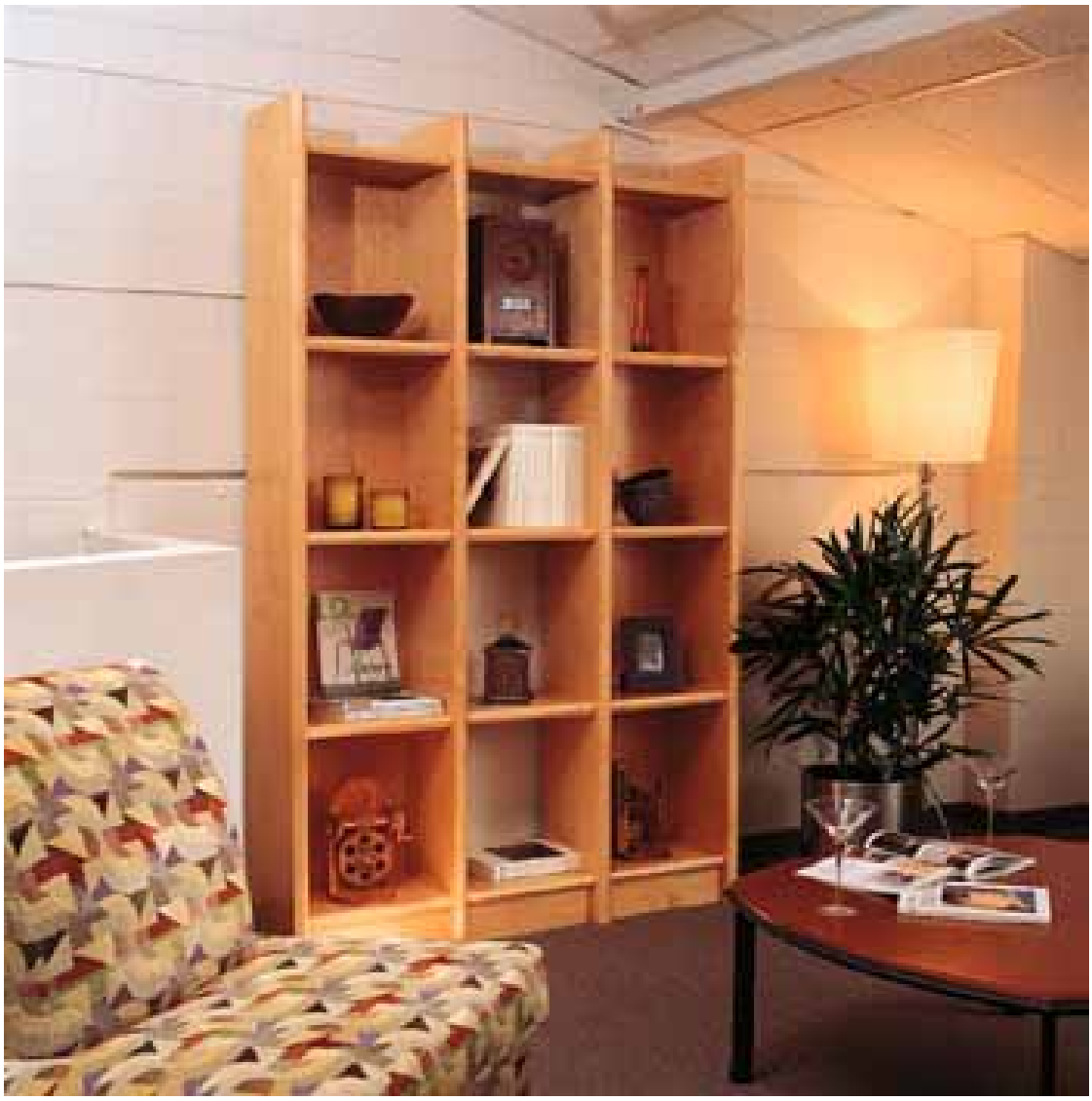
You can see the haunch on the tenons on the rail closest to the camera. When it comes to fitting your panels, remember to work tight in summer and loose in winter. Panels of this size will shrink and contract noticeably.

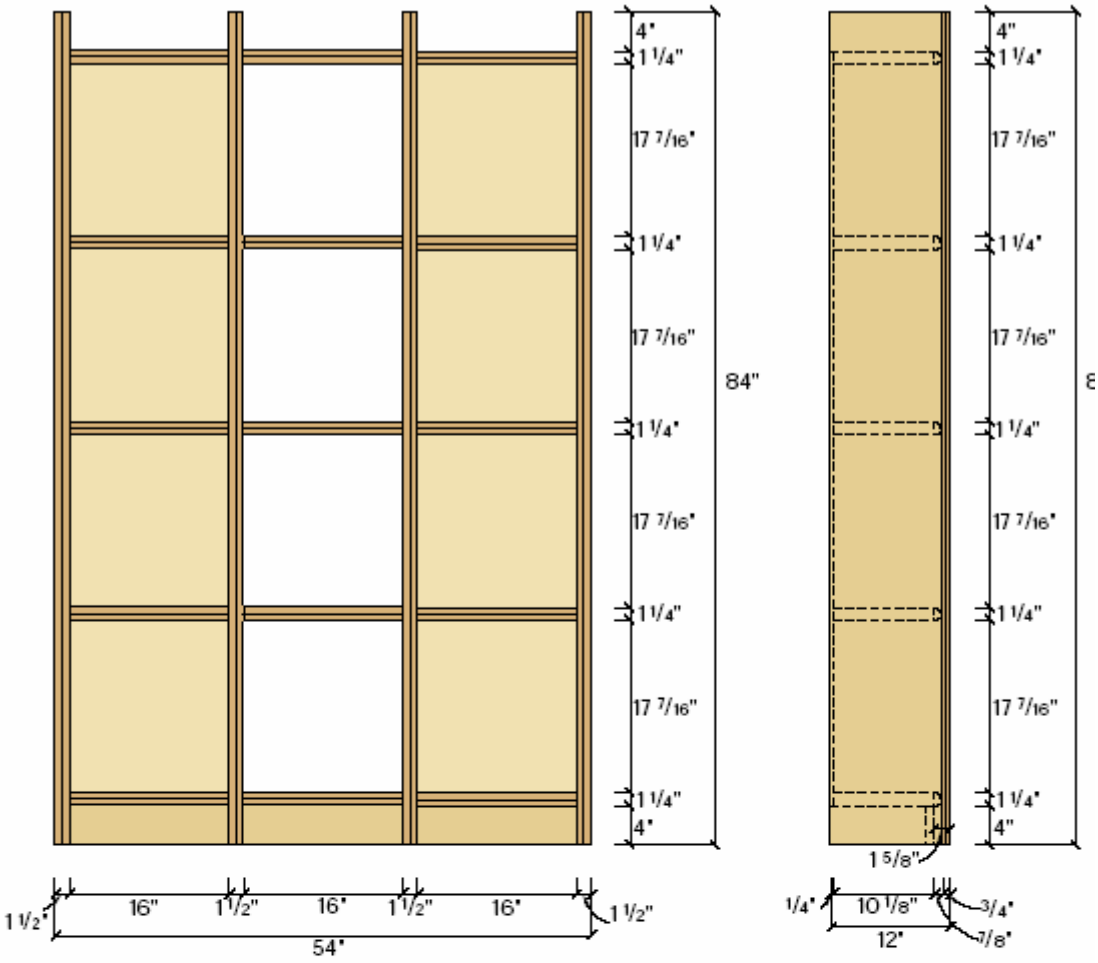
You could use a router and a straight bit to make this cut as long as you had a reliable way of guiding the router (such as an edge guide). I find a table saw is much faster for this operation.

Once you nail the dividers in place through the bottom piece, turn the case over on its feet and nail through the nailing strip into the dividers.

In addition to cutting this detail on the sides and front, I also cut it on the bottom of the plywood back, which gives it a finished look when the cabinet is viewed from down low or from a distance.

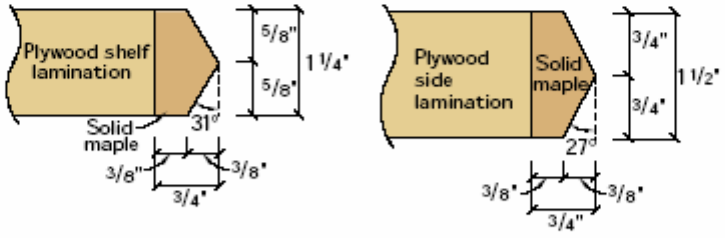
SHELVES





Elevation

Profile



Detail of bevel profiles

Schedule of Materials: Contemporary Shelves

No.	Item	Dimensions T W L	Material
4	Sides	3/4" x 11 1/4" x 84"	Plywood
4	Sides	3/4" x 11" x 84"	Plywood
10	Outr. shelf tops	3/4" x 10 1/8" x 16"	Plywood
10	Outr. shelf bottoms	1/2" x 10 1/8" x 16"	Plywood
5	Cntr. shelf tops	3/4" x 10 3/8" x 16"	Plywood
5	Cntr. shelf bottoms	1/2" x 10 3/8" x 16"	Plywood
2	Backs	1/4" x 17 1/2" x 76"	Plywood
3	Aprons	3/4" x 4" x 16"	Plywood
4	Side edging	3/4" x 1 1/2" x 84"	Maple
15	Shelf edging	3/4" x 1 1/4" x 16"	Maple

Supplies: Woodworkers' Supply (800-645-9292), 12 6" taper connectors, # 928273 $4.95/pkg. of four. 18 wire shelf supports, # 826028, $1.45 apiece for 10+.

www.TedsWoodworking.com

It's rare that bookshelves look as interesting as the objects you display on them. After all, how much can you decorate the edges of your shelves and sides? This unit is unusual because the shelves and sides are beefier than you would normally see, and the two bevel cuts on the front edges give these shelves nice visual interest. Best of all, perhaps, is that this piece is simple and quick to build.

Dividers and Shelves

Start by cutting out the sides and shelves. The 1-1/2"-thick sides are made by gluing two pieces of 3/4"-thick plywood together. The 1-1/4"-thick shelves are made by gluing 3/4"-thick plywood to a 1/2"-thick piece. Note that the finished sides have a 3/4" x 1/4" rabbet for the back that's formed by gluing a narrower piece to a wider one. The adjustable and fixed shelves in the side openings are all the same width. The center shelves are 1/4" wider to account for the lack of a back.

To cut the sides, crosscut a whole sheet of plywood to the length of the sides first, then rip them to width (11" and 11-1/4"). Cut the sides a little wide (1/16"), initially, to give yourself a little room to saw off a square straight edge. This will give you a clean edge for attaching a piece of maple later. Now nail and glue the dividers together, remembering to offset the back edge for the rabbet. Place your nails so the shelves will hide them.

Here's an easy way to cut the shelves. Rip them to width from a full piece of plywood, then nail and glue up a length of shelving. Then crosscut the shelves to length from the long pieces. You can get five 16" shelves out of a 96" rip. For even less work, cut the shelves to length after attaching the edging.

Edges and Angles

The edges for the bookshelves are solid maple. Because the thickness of 3/4" and 1/2" plywood is considered "nominal," you will end up with finished thicknesses about 1/16" less. Rip your edging stock a little wide and attach it with biscuits and glue. With a flush-cut bearing bit in a router, trim the edging flush to the sides and shelves, then clean up your work with a plane or scraper.

The last step is to bevel the edging. The photo shows how I did this on the table saw. Remember that the setup must change for the different width pieces.

Making it a Stand-Up Unit

The next step is to mill stopped grooves in the topmost and bottommost shelves to accept the tapered sliding connectors that attach the sides together. The grooves in the ends of the shelves are 3/4" wide by approximately 3/8" deep, and milled with a dado set on the table saw. It helps to make a practice joint because the depth of the groove is critical to a snug fit using this style of connector.

Installing the Shelves

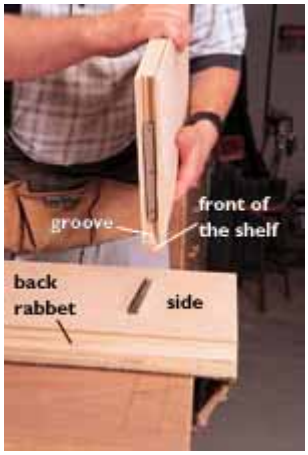
After cutting the slots in the shelves, lay out and mount the small part of the tapered connector to the side. The large connector will mount to the shelf groove with the wide end towards the shelf front. Do a test fit on the shelves. The shelves in the side units should be flush to the rabbet in the back edge of the sides. The center shelves should be flush with the back.

The next step is to cut the stopped grooves in the rest of the shelves for the hidden wire shelf supports. If your blade is too narrow, take two cuts to get the 1/8" groove necessary to slide the shelf onto the wire supports. Some drill and chisel work will be necessary to lengthen the kerf to accept the entire 9-3/4" length of the shelf wire. This requires drilling and chiselling into the end of the front edge. Lay out and drill the locations for the wire supports in the side and center sections so the shelf heights will match across the bookcase.

Now it's time for all the parts come together. Begin by assembling the two outside units

Face-Glue the Parts: Once you've got your parts cut to size, glue and nail them together leaving the rabbet at the back. Set and putty the nails, then rip the dividers to their final width.

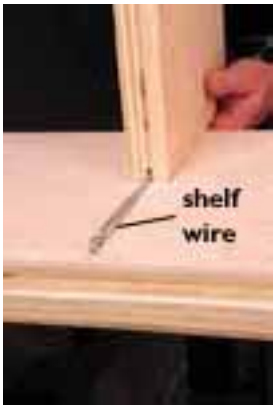
Profile: The bevels on the edges are basically a "V" shape on the entire edge. See the diagram at right for the details and cutting angles. Clean up your saw marks with a plane.



Mount Knockdown Hardware: Use a dado stack to cut a 3/4" x 3/8" groove from the joint where the edge attaches to the shelf to the back of the shelf. The knockdown hardware is mounted in about the middle of the shelf. It pulls together pretty tightly, so you might want to sand any bumps or ridges off the ends of the shelves to keep from scratching the sides.

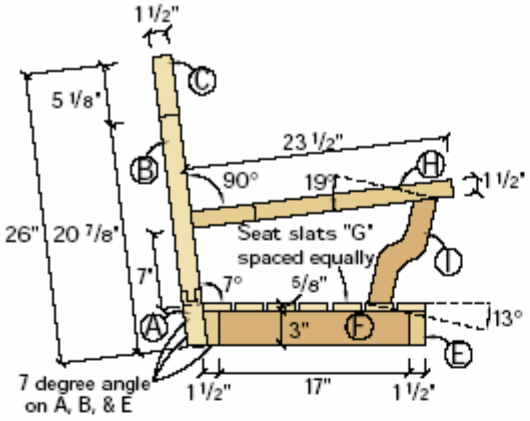
of the bookcase. Tip them onto their backs and attach the aprons to the bottom shelf using cleats and screws. Next attach the side units together forming the center section. The best way to do this is to assemble with the front facing up. Use a handscrew clamp to hold up the sides while you're assembling. The apron on the center bottom can be screwed onto the shelf and braced with corner blocks prior to assembly. Push the lower shelf into place and mark the location of the apron, also called a "kick" or a base. Then remove the shelf and add two stop blocks to the sides to support the center apron from behind.

When you're happy with the fit of the parts, disassemble the bookcase and finish. I applied a coat of light stain to give the maple an aged appearance. (I used about two ounces of linseed oil and colored it with Olympic stains, one-half Early American #41552, and one-half Red Oak #41567. 1/4 teaspoon of each.) Wipe on an even coat of oil. Wipe off the excess and let it dry for 24 hours.The next day, lightly sand the surfaces and clean them with a tack rag. Finish with two or three coats of a clear finish.



Magic Wire: After cutting the 1/8" grooves in the shelf sides, assemble the case. Tap the wire shelf supports in and slide the loose shelves in place.

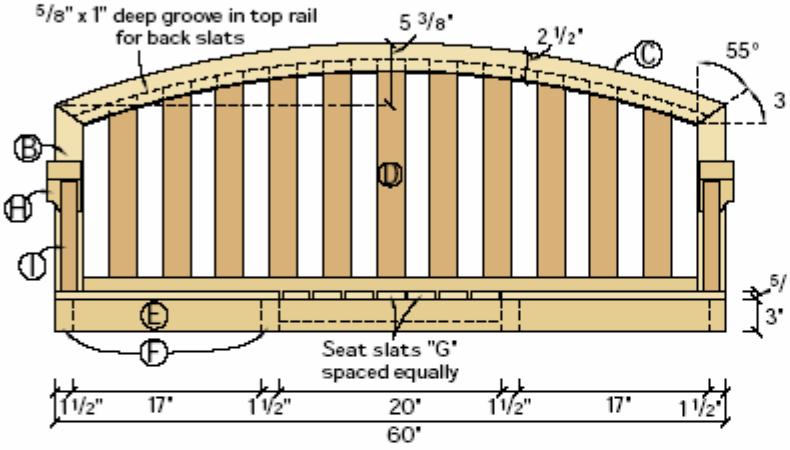
GARDEN SWING

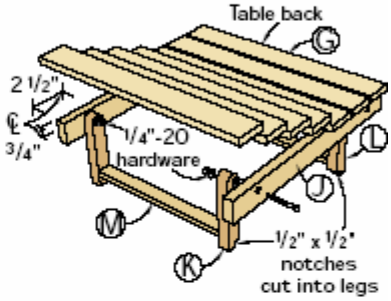


Schedule of Materials: Garden Swing

No.	Ltr.	Item	Dimensions T W L	Material
1	A	Bottom back rail	1½" x 5" x 55"	Cedar
2	B	Back stiles	1½" x 2½" x 20⅞"	Cedar
1	C	Top back rail	1½" x 8" x 60"	Cedar
11	D	Back slats	⅝" x 2½" x 20½"**	Cedar
2	E	Seat rails	1½" x 3" x 60"	Cedar
4	F	Seat stringers	1½" x 3" x 17"	Cedar
21	G	Seat slats	⅝" x 2½" x 20"	Cedar
2	H	Arms	1¼" x 3" x 23½"	Cedar
2	I	Arm supports	1½" x 4" x 12"**	Cedar
2	J	Table battens	¾" x 1½" x 19⅞"	Cedar
2	K	Table legs	1" x 1¼" x 6½"	Cedar
2	L	Table legs	1" x 1¼" x 8¼"	Cedar
2	M	Table leg braces	⅝" x 1¼" x13"**	Cedar
2	N	Table support cleats	1" x 2" x 20"	Cedar

*Longest slat, cut to fit. **Length oversize to allow fitting.

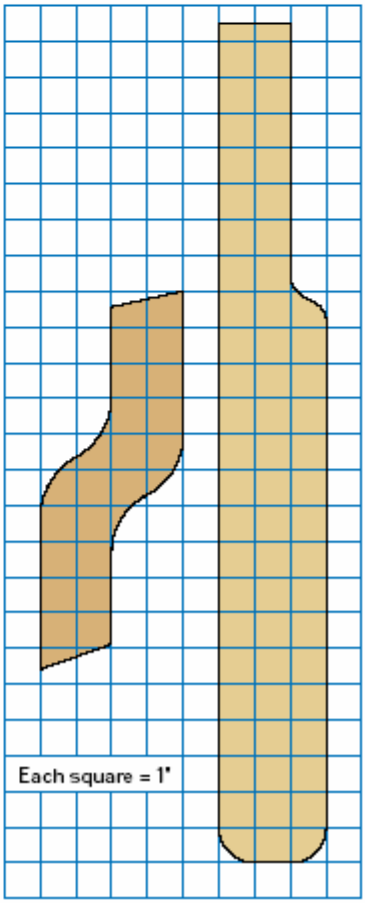




Schedule of Materials: Swing A-Frame

No.	Item	Dim. T W L	Material
4	Frame legs	4 x 4 x 96"	PTP
1	Top center rail	4 x 4 x 96"	PTP
2	Top outer rails	2 x 4 x 96"	PTP
2	Leg supports	2 x 6 x 48"	PTP
4	Swing-N-Slide EZ Frame Braces		
4	Swing-N-Slide Leg top braces		
2	⅜" x 6" eye bolts		
4	⅜" flat washers		
4	⅜" nuts		
8	S- connectors		
4	6-foot lengths of chain		

PTP = pressure treated pine



Start the project by heading to the lumber yard. The six-foot swing as shown required one 2x8, one 2x6, five 2x4s, and 10 1x4s all in eight-foot lengths. I chose western red cedar because it's a durable, lightweight, outdoor wood and is less expensive than redwood. At Midwest prices, the lumber cost about $120.

Seat Frame

Once back in the shop, start construction by cutting the seat rails and stringers from the 2x4s. As you probably know, dimensional lumber comes with rounded edges. You'll need to get rid of them. Cut the pieces for the rails and stringers to their 3" thickness by first running one edge over the jointer until they have a square edge, then rip them to 3" wide. To give the seat a comfortable back angle, set your saw blade to an 7-degree bevel and run the back rail on edge to give a 7-degree angle to the back.

Now cut the pieces to length and screw the stringers between the rails, spacing them as shown. The center section spacing is critical because the pop-up table needs to be square so it can be lifted out and turned in place and the legs lowered. Use 2" galvanized deck screws when screwing the seat frame together.

Mill all the slats at the same time because they are essentially the same size. Cut the 1x4s into 24" lengths, and plane the boards to 5/8" thickness. Then rip them to their 2½" width and crosscut the seat slats to 20". To give the swing a finished look, cut an 1/8" roundover on all four top edges of each seat slat using a bit mounted in a router table.

Attach the slats for the permanent seats, running the slats from side to side. They should flush up in length to the outside edges of the stringers, and the front slat should be flush to the front rail. Use about 3/8" spacing between the slats. I decided to attach the slats to the frame using finish nails and an air nailer. This left a much smaller hole than screws, and it was very quick.

To finish the seat I decided to build the top surface of the table at this point. The spacing works the same as on the side seats, but run the slats from front to back. The slats are attached to two table battens (¾" x 1-½" x 19-7/8") that are held 1/16" or so away from the inside face of the front and rear rails. This gap should allow the table to lift out without binding, but some slight fitting may be necessary. Don't worry about the legs yet, we'll do that later.

Build the Back

Next, turn to the back of the swing. Mill the bottom back rail and two stiles to size as described earlier to leave crisp edges. Run the bottom edge of the bottom back rail and both stiles through the saw at an 83-degree angle to match the bevel on the seat. Then take the 2x8 top rail and lay out the top arch of the swing by marking the center of the rail, then mark 2-½" down from the top at the center. Tap a small brad nail into the board at this spot, then put two more brad nails into the board at the bottom corner of the board at either end. Then take an eight-foot strip of ¼"-thick wood and bend it across the top nail, attaching the strip to the two lower nails with spring clamps. The arch formed by the strip can then be marked with a pencil, and then a second line (2-½" above the first line), marked. Jigsaw the piece to the outside of these lines, then sand the piece smooth.

To determine the length of the top rail, lay the bottom rail and side stiles flat with the bottom rail between the stiles. Clamp these pieces in place, then lay the top rail across the tops of the stiles, flush to the top outside corner of each stile. With the top rail in place, mark the point where the inside curve of the rail intersects the inside edge of the stiles. Connect the two points and this is the angle to cut on the top edges of the stiles and on the ends of the top rail, to form mitered joints. The back frame will be held together with a double helping of biscuits, but first you need to cut the groove in the top and bottom rails to hold the slats.

With the seat frame assembled, nailing the slats in place was a cinch with a pneumatic finish nailer and stainless steel nails. Note the 7-degree bevel on the rear of the back seat rail.

Holding the arched top rail steady was the most difficult part of routing the top groove for the slats. Remember to make the cut in two passes on each side. In this photo you can see that the rail hasn't been cut for length yet, allowing extra support for the router at the beginning and end of the cut .

With the miters cut on the top rail and back stiles, space the slats and use the top rail to mark the angle and length of each slat, (adding 1").

Running the groove in the bottom rail is fairly simple. Set up a router with a straight bit (or an up-spiral bit) of either 3/8" or ½" diameter. Next set up a fence on the router 7/16" from the bit, and set the bit for a ½" depth. (The final depth is 1", but take it in two passes.) By running the router on both long edges of the rail, the groove will be centered on the piece. Check the fit of the back slats in the rail (or better, a test piece), then make the groove.

To cut the same groove in the arched top rail, see the photo at left. You will need to adjust the depth of the final cut a bit to compensate for the curve of the arch.

Miter the top rail to length, then check the fit of your slats in the grooves. The spacing between the slats should be about 2-¼", but double-check your dimensions.

After cutting the double biscuits at the joints, place the slats in the bottom groove and locate the top rail in position on the slats. Mark the height and curve on each slat. Remove the slats, numbering them as you do. Now add 1" in length to the marks on the slats and cut them to their finished length using the band saw. You're now ready to glue up. I used polyurethane glue for all my glued joints. The polyurethane adhesive provides a strong water-resistant bond in even long-grain to short-grain joints. Don't glue the slats in place, however. Place them in the grooves in their approximate positions, then after the frame has dried, use a brad nailer to tack the slats in place with a single brad at top and bottom, from the back. To protect the lower rail from rot from standing water in the groove, cut blocks, (called fillets), the size of the spaces and glue them in place.

You're now ready to glue and bolt the back to the seat. I used four ¼" threaded bolts with washers to bolt the bottom rail of the back to the back rail of the seat. Hold the bottom edges of each flush, and again use polyurethane glue on this joint.

Next cut the two arms and arm supports from 2x4 material and cut them to shape using the scaled drawings on the next page. You may want to cut the angle on the bottom of the support and on the back end of the arms, then fit them in place and confirm the location and angle of the top end of the supports. Attach the arms to the back with a long deck screw through the back stile. Glue the support to the arm and to the seat with ½" dowels between.

The last step is to put the legs on the table, and to notch and fit the support cleats. Start by cutting the leg pieces to the sizes given in the Schedule of Materials. They are two different lengths to allow the table to sit parallel to the ground, even though the swing itself is angled back. Round over the top end of each leg to allow it to swivel without catching, then drill ¼" clearance holes, ½" down and centered on the legs. Drill clearance holes in the table battens ½" up from the bottom edge, and 1" in from the inside corners. Attach the legs using ¼" x 2½" bolts with two washers on either side of the leg and a nylon-lined nut to hold the legs tight, but not immobile.

Check the spacing between the legs (near the bolts) then cut the leg braces to fit, and screw them in place between the legs.

Now head back to the saw and cut the two table support cleats to fit between the inside stringers. Clamp these in place, center the table in place left to right and mark the location of the legs.

Remove the cleats and cut 7/8" x 1" notches on the leg locations. Then use a handsaw to trim the ends of the legs to form tongues to fit into the mortises you've just created in the cleats. Glue the cleats in place, and once dry, the table will drop into place in the cleats, holding the table steady.

After adding 3/8" x 4" eye bolts to the front and rear of the swing seat, the swing is ready to hang. If you've got a porch, find a sturdy joist and get the lemonade. If you happen to be missing a porch, construct a simple A-frame structure to let you swing in style anywhere in your yard.

The back of the arm is simply screwed in place through the back stile, while the support is attached to the arm and seat with dowels and polyurethane glue. Notice the foamy squeeze-out of the glue at the joints.

With the notches cut in the support cleats, the two pieces can be glued in place in the seat frame.

Last, but not least, bolt the table legs in place to the table battens. Note the notches on the ends of the legs which drop into the previously cut notches to stabilize the table.

GLOBE STAND

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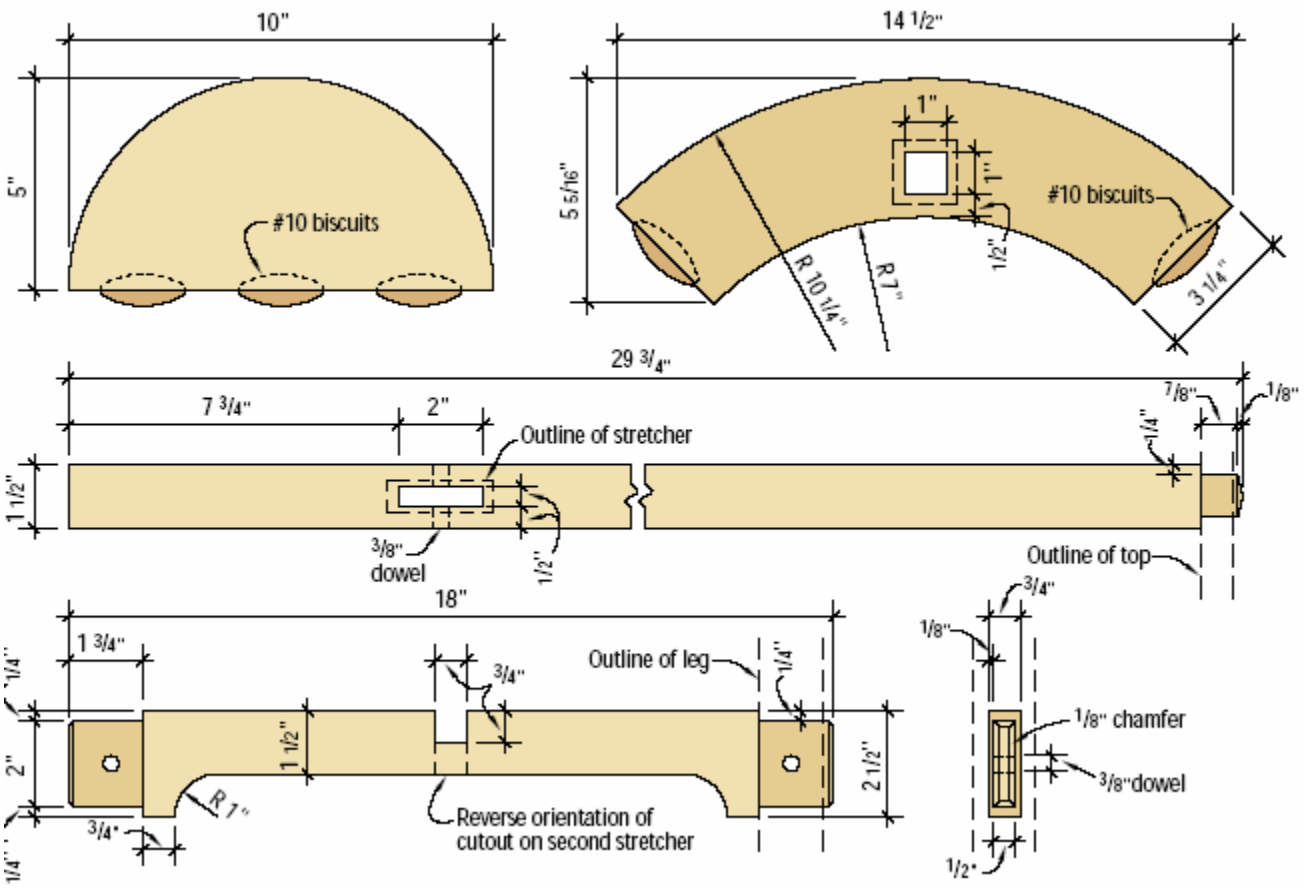
You might prefer a tapered-leg taboret with wedged tenons...

...or a globe stand in the style of Frank Lloyd Wright...

...or even in the style of a Gustav Stickley end table.

ARTS & CRAFTS GLOBE STAND

	NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL
☐	4	Top pieces	3/4	5 5/16	14 1/2	Cherry
☐	2	Table pieces	3/4	5	10	Cherry
☐	4	Legs	1 1/2	1 1/2	29 3/4	Cherry
☐	2	Stretchers	3/4	2 1/2	18	Cherry
☐	4	Corbels	3/4	7/8	9	Cherry



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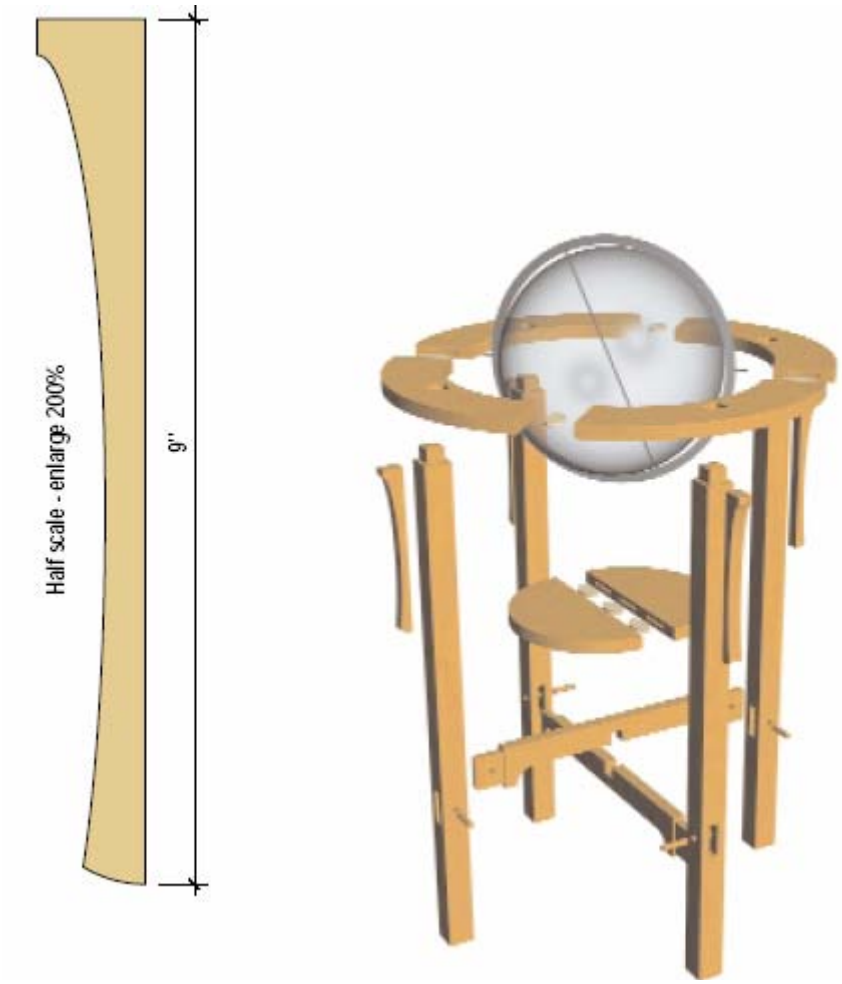

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Around the World in Four Easy Pieces

Start by laying out the four top quadrants. With the exception of the legs, all the parts for this project are sized to be cut from 1 x 6 stock. Before turning to your band saw to test your eye/hand coordination on the outside curves, cut the 1" x 1" mortises. They're easier to form when there are still flat sides to press against a fence.

While splined joints might have been another "trick" that I could have thrown into the mix, I opted for the ease and familiarity of biscuits when assembling the ring. After gluing up the ring, cut the arcs slightly wide of the line on the band saw. I used a shop-made circle-cutting jig on my router table to refine the outside edge. Then I used a router edge guide to trim the inside edge to a perfect circle.

I also used biscuits to join the two halves of the lower table. I added another level of detail with a ¼" x ¼" chamfer on the top edge of both the ring and table. Finally, I plowed two ¼"-deep x ¾"-wide grooves that crossed in the middle of the bottom of the table to position it squarely on the stretchers.

The legs are formed from 2 x 2 stock. Although the ½" x 2" through-mortises were made on the legs with a straightforward series of cuts with a ½" mortising chisel, the through-tenons required some attention to detail. After cutting the tenons on the ends of the legs to fit the mortises, I determined that a 14° bevel would give me an 1/8"-high pyramidal top. The tenon is sized to allow for an 1/8" vertical rise above the top before transitioning into the slopes. I like the look, and it's more forgiving than trying to align four pyramid bases exactly with the tabletop.

The stretchers are joined with a simple half lap. The ends of the through-tenons are chamfered at a 45° angle. I then pegged each tenon using 3/8" cherry dowels through

Use the plans from the diagrams to lay out your mortises on your top pieces. Draw the mortise locations on paper, photocopy the plans and use rubber cement or a spray adhesive to attach them to your wood. Then it's simple matter of cutting where the lines tell you to.

After you've cut your top to size, you need to clean up the band-sawn edges using a router table, a straight bit and the shop-made jig shown here. First cut a piece of ¼"-thick plywood to the same size as your top and attach it to the top using a spray adhesive. Nail the center of the ¼" plywood to a sub-base of ¾" plywood. My router table is part of my table saw setup, so I attached a miter bar to the ¾" plywood, which allowed me to slide the jig into position. If you don't have a miter slot, you

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23/64" holes after slightly tapering the ends of the dowels. With the holding power of contemporary glues, they're only for show anyway.

Speaking of show, the corbels that "support" the top are structurally unnecessary to this project. Visually, however, they're the icing on the cake. Glue them in place and clamp them up.

To mount the globe on the stand, you need to cut two ¼"-long x ¼"-deep notches in the inner edge of the ring. Rather than setting up my router and a jig for the operation, I chucked a ¼" Forstner bit into my drill press, made a ¼"-deep hole that was tangent to the inner edge, and squared up the bore with a sharp utility knife. See the photo at left for details.

Because cherry darkens quickly enough through oxidation and exposure to ultraviolet rays, I used a clear wipe-on oil finish to emphasize the contrast between the end grain of the through-tenons and pegs and the face grain of the legs and top. If you've got 'em, you might as well flaunt 'em.

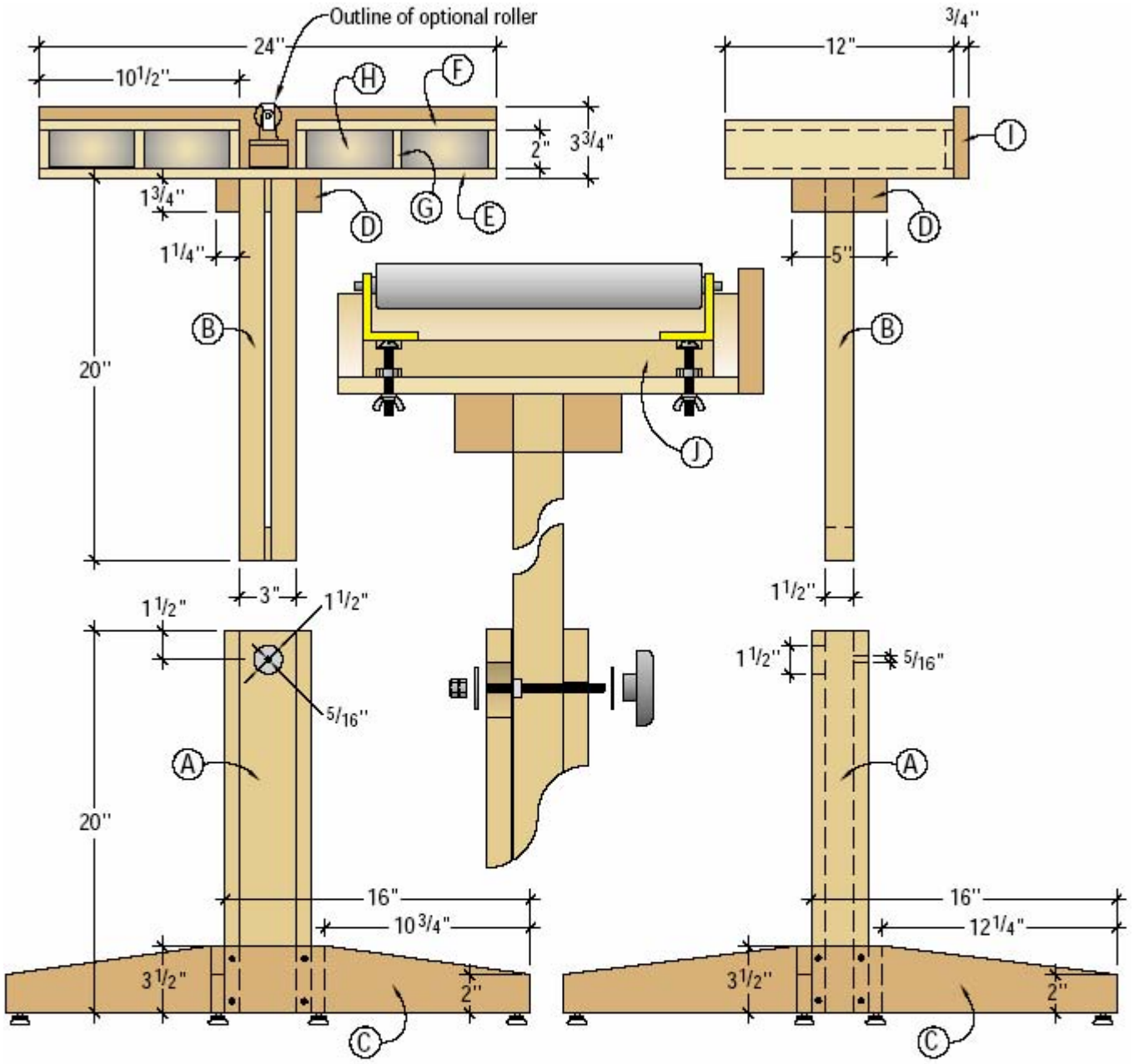
might need to first clamp the jig in place and raise the router bit while it's running to get your cut started.

Once you get the outside shaped perfectly, you can use that edge to guide your router. I used a commercial edge guide (the Micro Fence). Essentially, two rounded guides ride along the outside edge of the top, ensuring the straight bit cuts a perfectly circular path. You also could make this cut using a commercial or shop-made circle-cutting jig for a router.

Though there are many complicated ways to attach corbels to legs, I prefer to simply glue and clamp them in place.

Here's a close look at the notches in the top that hold the pins on the globe.

LUMBER CUT-OFF STAND



CUT-OFF STAND

	NO.	LET.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL
❑	4	A	Column sides	3/4	3	20	Hardwood
❑	1	B	Post	1 1/2	3	20	Hardwood
❑	4	C	Feet	3/4	3 1/2	16	Hardwood
❑	2	D	Mounting blocks	1 1/4	1 3/4	5	Hardwood
❑	1	E	Bottom	1/2	12	24	Plywood
❑	2	F	Tops	1/2	12	10 1/2	Plywood
❑	6	G	Dividers	1/2	2	12	Plywood
❑	4	H	Backs	1/2	2	4 1/2	Plywood
❑	1	I	Fence	3/4	3 3/4	24	Hardwood
❑	1	J	Roller block	1 1/8	2	9 1/2	Hardwood

	HARDWARE NO.	ITEM
❑	1	Star knob, (item# 862214)*, $1.49
❑	1	Threaded rod, 1/4"-20 x 3 1/2"
❑	4	1/4"- 20 hexagonal nuts
❑	1	1/4"- 20 square nut
❑	2	1/16" x 1 1/2" fender washers
❑	2	1/4"- 20 x 1 3/4" machine bolts
❑	2	1/4"- 20 wing nuts
❑	2	1/4" lock washers
❑	1	10" roller (item #921635)*, $7.69
❑	1	Bracket set (item #95-505)*, $3.29

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The stand is remarkably simple to build. Make the lower support using ¾"-thick hardwood of your choice that's glued and screwed together using butt joints. The slotted post supporting the top section is formed by cutting, then regluing the pieces – no complicated router work. The top is ½"-thick Baltic birch plywood pieces nailed together to form a torsion box for extra strength.

From the Bottom Up

To make the stand easily adjustable in height, I chose a post-in-sleeve design. Start with the post. The finished size of the post is given in the materials list, but start with a length of wood that is ¼" wider, thicker and longer than the finished size. This leaves room for saw cuts to form the slotted post and fitting room for overall size.

Next, take a look at the square ¼"-20 nut you have for the locking hardware. Measure the width across the nut and add a fraction of an inch to that dimension. This will be the gap that you want to leave in the center of the post. The square nut will need to move freely up and down the gap, but not turn in the space.

Form the post by ripping the board into three lengths, with the two outer pieces being equal in width, and the center piece being the same width as the nut. Then crosscut the narrow piece into two 1-¾"-long pieces. Glue those between the long outer sections and your post is almost complete.

Once the glue has dried, remove it from the clamps and run it through your planer to fine tune the thickness. Trim the post to length and move on to the sleeve.

The sleeve is formed by cutting the pieces to size, then simply gluing the four pieces together to form a rectangular column. Be careful to align the pieces to avoid cleanup and provide a square (and glue-free) center sleeve.

Lock-n-slide

The locking mechanism for the post is a length of threaded rod with nuts, a couple of fender washers and a handle slipped through the column. To make the clearance holes in the column, measure down 1-½" from the top on the front side and make a mark in the center of the column. Take the column to your drill press and, using a 5/16"-diameter drill bit, drill completely through both sides of the column.

Now switch to a 1-½"-diameter Forstner bit and, using the 5/16" hole on the back side as your center, drill a larger hole in the back.

The rest is hardware. Spin the two hex nuts onto the end of the threaded rod and use wrenches or pliers to tighten the nuts against one another to lock them in place. Then slip one fender washer on the long end of the rod and against the pair of hex nuts.

Now thread the square nut on after the washer and tighten it against the washer and hex nuts. Insert the assembly (long end first) into the larger hole in the back of the column, threading it into the center slot in the post (which you've slipped into place).

When the threaded rod pokes out the 5/16" hole on the front side, add another washer and the star handle. You're done. Make sure the square nut is rotated to slip into the slot to make a tight fit.

Add the Feet

The last part of the base is the feet. These are just four boards screwed to the bottom of the column. I trimmed a long taper on the top of each to make it a little more aesthetically pleasing.

When you drill the clearance holes for the screws, pay attention to where the screws are located, or you'll end up drilling into another screw. Offset them slightly and you'll be fine.

With the feet attached, I added four adjustable leveler feet to make sure the stand would

To form the post, the rough piece is ripped into three pieces, the center piece is cut to form two small blocks, and then the whole thing is glued back together.

As you glue up the column, use the post to check the spacing. The post should slip easily into the sleeved column. You want the post to move easily, but don't make make it too loose or you'll make the stand wobbly.

The feet are attached to the column with flat-head screws. Watch the screw alignment or you'll drill into another screw.

Some simple hardware from your local home center store allows you to lock the post solidly, but quickly loosen the post and readjust for any height. The hardware is shown at right, resting on top of the

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sit solidly on my uneven garage floor.

Torsion-box Top

I wanted to make the top of the stand as lightweight and strong as possible, but still stable. To accomplish this I used ½"-thick Baltic birch plywood and built an open-front torsion box.

Before making the box, locate the center position on the bottom plywood piece and mark where the top of the post will meet the box. Then screw two 1-¼" x 1-¾" x 5" solid-wood blocks to the underside of the plywood, centered and on either side of the post's location. Use these two mounting blocks to attach the table to the post after you have completed the table.

To form the box, simply assemble it with a brad nailer, making sure to align all the edges to keep things square. The two tops are held flush to the outside ends, leaving a 3"-wide gap in the center to allow plenty of room for a circular saw or jigsaw blade. The space in "the valley" ends up at a 2-½" depth, which should allow clearance for almost any jigsaw blade and lots of room for the blade of a circular saw.

With the table frame complete, nail ½" x 2" x 4-½" backs into the spaces at the rear of the box, closing up the opening. The hardwood fence is next. Drill four clearance holes and screw the fence to the back of the box, screwing into the backs.

To avoid any concern of binding a saw blade during the first few uses, cut a notch in the fence 1" wide and as deep as the blade depth you're most likely to use.

You're now ready to attach the table to the base. Drill clearance holes in the center of the mounting blocks under the table, then screw the table to the post.

A Little Something Extra

The roller is really inexpensive, and is quick to put together and attach. Simply drill two ¼" clearance holes in the 1-1/8" x 2" x 9-½" roller block, 1-½" from each end, and centered on the block. Use a ½"-diameter drill bit to countersink the top of the holes to fit the head of a machine bolt and a locking washer. Then flip the block over and use a 1-½" Forstner bit to countersink the bottom of the hole to accept a hex nut.

Before attaching the hardware, place the block in the table valley and use a pencil to mark the hole locations on the table bottom. Then drill oversized ¼" holes at those locations.

With the bolts inserted and tightened down, screw the roller mounting brackets in place on the block. The ends of the bolts will slide easily into the holes in the table, and the roller can then be attached using two wing nuts. When the roller isn't needed, it fits snugly inside any one of the open-end spaces in the table.

No matter where you use this stand, you'll find rough-cutting lumber a more pleasant experience. I'm pretty sure there are a few other uses for this stand as well. Just give me some time.

column before being attached through the holes.

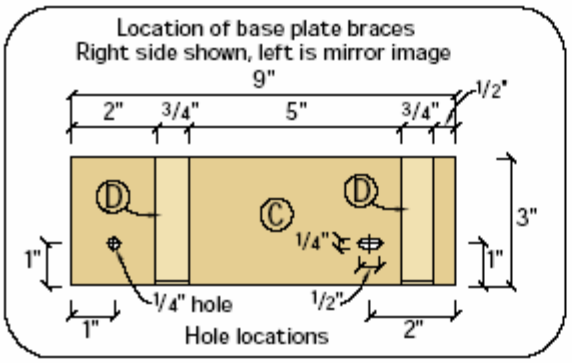
This shot shows the partially assembled table, with three exposed dividers and the other side covered with the top. You can also see the screws through the bottom that hold the mounting blocks in place. While the box itself is nailed together, the fence is attached with screws to allow for replacement if it gets cut up too much in use.

DRILL ~~PRESS~~ TABLE

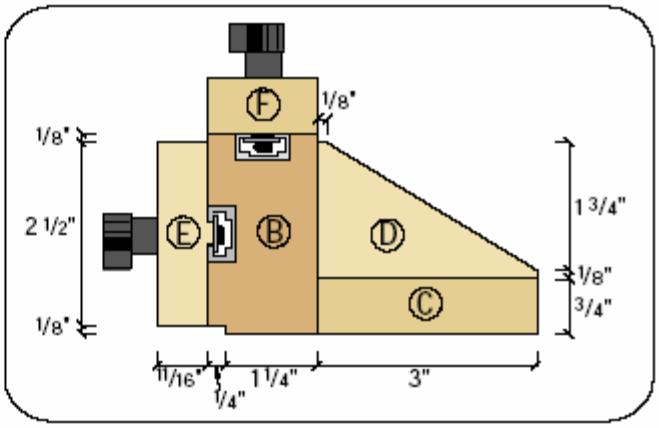
Schedule of Materials: Drill press table

No.	Lett.	Item	Dimensions T W L	Material
1	A	Platform	3/4" x 20" x 29"	Plywood
1	B	Fence	1 1/2" x 2 3/4" x 30"	Hardwood
2	C	Fence base plates	3/4" x 3" x 9"	Plywood
4	D	Base plate braces	3/4" x 3" x 1 7/8"	Hardwood
2	E	Stops	3/4" x 2 1/2" x 2 1/2"	Hardwood
2	F	Hold-down plates	3/4" x 1 1/2" x 3"	Hardwood
1	G	Insert plate	3/8" x 4" x 4"	Plywood
2		Part #88F05.02 DeStaCo clamps — $14.50 ea.		
6		Part #12K7901 24" T-slot track — $4.95 ea.		
8		Part #00M5102 1 1/8" 3-wing knobs — $6 for 10		
8		Part #05J2115 T-nuts — $1.15 for 10		

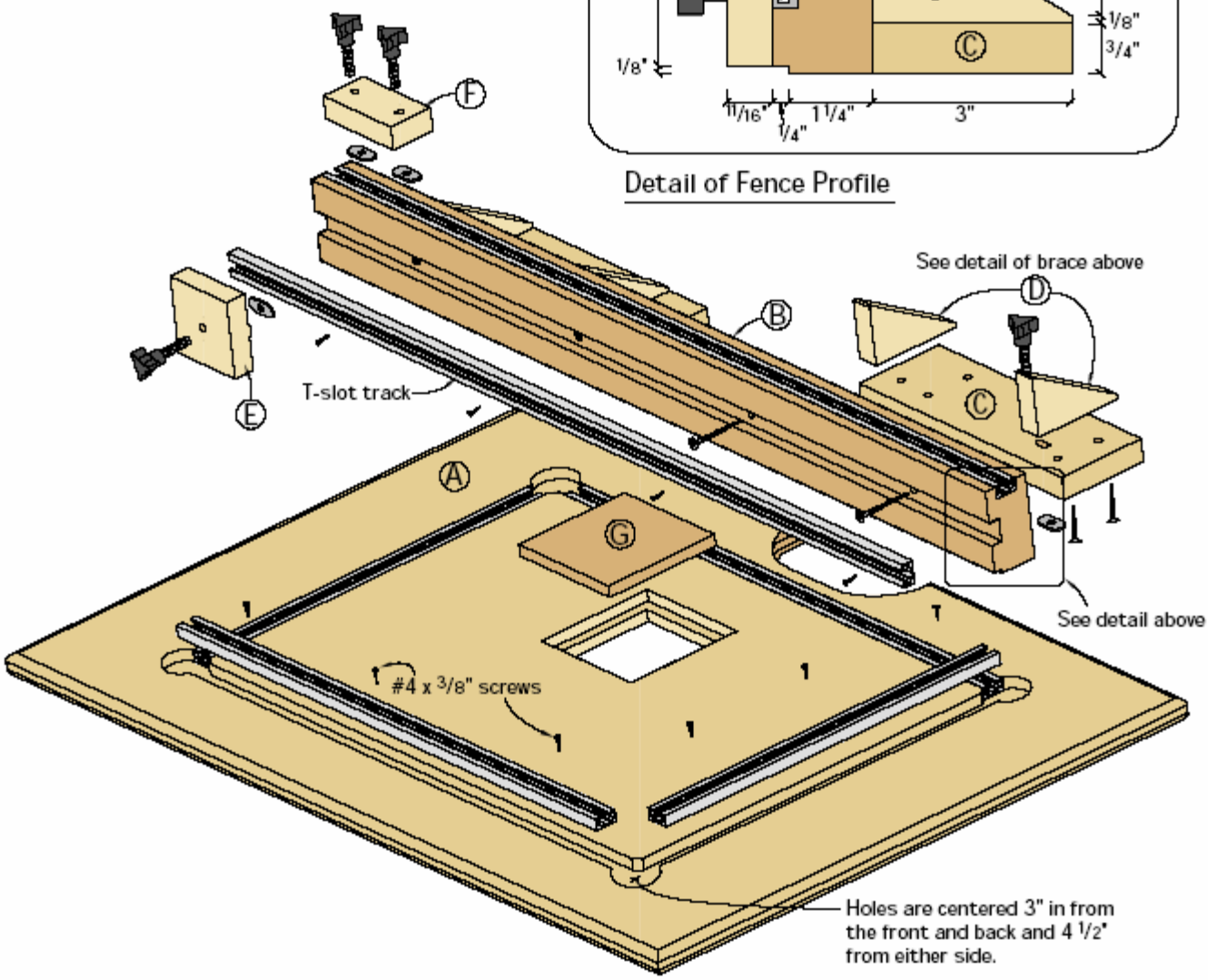
All hardware available from Lee Valley 800-871-8158



Plan detail of hole locations for base plate



Detail of Fence Profile



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Start With the Base-ics

The base platform for the table is made from 3/4" plywood, which should be void-free. Again, adjust the size as necessary to fit your drill press. First you need to get the table ready for the T-track, which is what holds the fence and hold-downs in place. Start by locating the four recessed holes that allow the T-slot mechanism to slip into the track without disassembling the mechanism. Each hole is 1-1/2" in diameter and 3/8" deep.

Next, locate the grooves in the center of the holes and use a router with a 3/4"-wide straight bit to cut the grooves to a 3/8" depth. The T-slot track should fit into the grooves with the top surface just below that of the plywood table. The grooves should be as parallel as possible to one another to allow smooth movement of the fence.

Another view of the drill-press table. Here I'm cutting pocket holes in a table apron.

Replaceable Center

Now cut the hole for the 4" x 4" replaceable insert. First locate and mark the position centered on your table, then mark in from that line by 3/8" to locate your cutting line. Drill clearance holes in two corners of the square, then use a jigsaw to cut out the center piece. Next, determine the thickness of the material you will use for your insert (the 3/8"-thick Baltic Birch we used is actually metric and shy of 3/8") and set a 3/8" piloted rabbeting bit in a router to a height to hold the insert flush to the top surface of the table.

While your jigsaw is still out, locate, mark and cut out the notch in the back of the table. This allows the table to move closer to the drill press' post and tilt without interference.

As a final friendly touch on the table, I used a 3/8" roundover bit in my router to soften all the edges on the table, both top and bottom. You'll get fewer splinters if you do this.

ROUT THE GROOVE The grooves for the T-slot track allow the fence to be used left-to-right and front-to-back on the table to take advantage of the built-in tilting feature of the existing table.

Milling the Fence

The fence is the heart of the table, and the wood should be chosen for durability and straightness. Quartersawn hardwood, carefully surfaced and planed, will do nicely. After cutting the fence to size, use a dado stack to mill two 3/8"-deep by 3/4"-wide grooves in the fence. The first is centered on the top surface of the fence, and as in the grooves in the base platform, a piece of T-slot track should be used to confirm that the groove is deep enough to allow the track to fit just below the surface of the wood. The second groove is then cut centered on the face of the fence. One other bit of table saw work is the 1/8" x 1/4" wide rabbet cut on the inside bottom edge of the fence. This rabbet allows dust and debris to be pushed into the rabbet, so your work will fit against the fence.

One option that I considered was adding an indexing tape measure on the fence. Every time the table is moved the tape would need to be readjusted to zero, and for the infrequent use the tape would see I decided against it. A stick-on tape can easily be added to the fence face if that's more to your personal taste and needs.

RABBET FOR THE INSERT After cutting the hole with a jigsaw, the opening is rabbeted using a bearing-piloted router bit. Then chisel the corners square and fit the replaceable center tightly into the rabbet. Make a couple extras.

Fence Support Braces

Unlike the fence on a router table, the fence on a drill press table won't see a lot of lateral pressure. So the main purpose of the braces is to hold the fence square to the table at the drilling point. In my case I've also given the braces the job of mounting the fence to the table.

Start by cutting the two base plates and the four braces to size. The braces are triangles with the bottom edge 3" long and the adjoining right angle edge 1-7/8" long. The third side is determined by simply connecting the corners. Locate the braces on the base plates according to the diagrams and pre-drill and countersink 3/16" diameter holes in the base plates to attach the braces to the plates.

To mount the support braces to the fence, again refer to the diagrams to locate the proper spacing on the fence. Then drill and countersink screw holes through the face groove in the fence. Clamp the brace to the fence and screw the brace in place.

ROCK SOLID The fence is made of a sturdy, stable hardwood. Cut a groove the length of the top and face of the fence. The grooves support T-slot tracks, which can be used for stops, hold-downs and other accessories.

With the braces attached to the fence, use the T-slot fastener locations on the diagrams

as a starting point for drilling the holes in the base plates, but check the location against your table for the best fit. Two holes are drilled in each plate to allow the fence to be moved to the perpendicular position (either to the right or left of the quill), by simply relocating one of the T-slot fasteners. Check each hole in relationship to that position.

Attaching the Track

Assuming you purchased the 24" lengths of track listed in the Schedule of Materials, you should be able to cut the tracks for the table first, leaving fall off that can be added to the two remaining full length tracks to give you the necessary 30" lengths of track for the fence. When attaching the track, first pilot drill the hole in the center of the track (a groove is provided in the track to simplify that location), then use a countersink to widen the hole to accommodate a #4 x 5/8" flat head screw. Keeping the screws as flush as possible to the inner surface of the track will make the stops and hold-downs move much easier.

Finishing Touches

Stops and hold-downs designed for use in T-tracks make the drill press most useful. The stops are simply square blocks of wood with one side milled to leave an indexing strip that fits into the slot on the T-slot track. By using the saw to cut tall but shallow rabbets on two edges of each block, the stops are completed fairly easily. For safety, run the rabbet on a longer 2-1/2" wide piece of wood, then cut the stops to square afterward. The T-slot fasteners are simply inserted into a 1/4" hole drilled in the center of each stop block.

The hold-downs are simply blocks of wood with DeStaCo clamps mounted to the top. Each block is drilled for two T-slot fasteners, one on either end. Then the clamp is screwed to the top surface of the block. While the DeStaCos are good for this application, they aren't as versatile as I wanted. I replaced the threaded-rod plunger with longer all-thread (1/4" x 36) to provide maximum benefit from the clamps. The rubber tip of the plunger is important to the function of the clamp, and if you can manage to reuse the existing tip it's very helpful. If not, I found rubber stoppers in a variety of sizes in the local Sears hardware store. After carefully drilling a 1/4"-diameter hole two-thirds of the way into the stopper I was able to screw it onto the rod with little difficulty.

Attaching and Personalizing

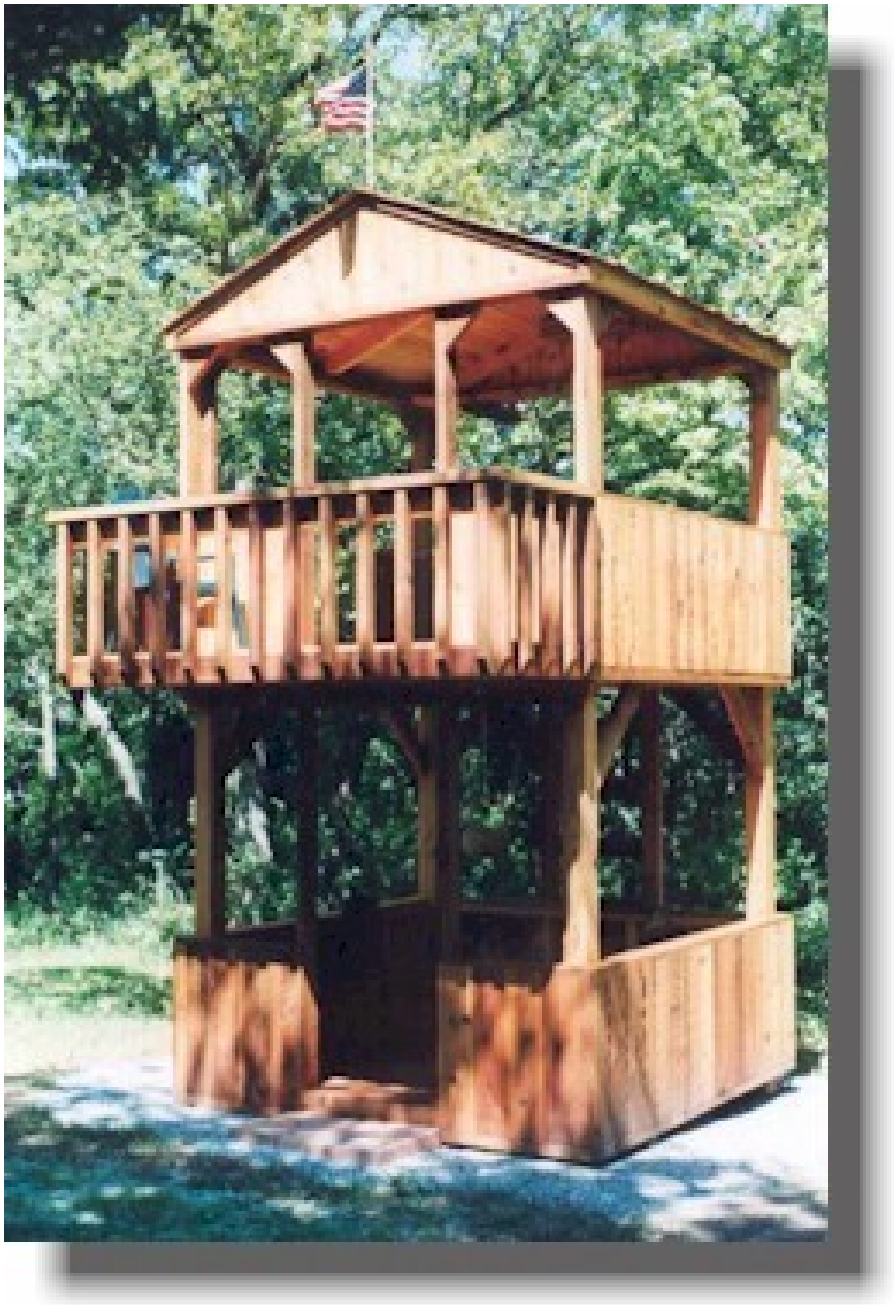
The table should attach easily to your existing drill press table using four lag bolts countersunk flush into the surface of the auxiliary table. Once attached you should find that the auxiliary table overhangs the metal table quite a bit. One personalized touch I want to suggest is adding small drawers to the underside of the table to store bits, wrenches and chuck keys..

FENCE BRACES The fence is supported by two simple brackets screwed to the rear of the fence. The location of the triangular braces is important to the track orientation, so follow the diagrams carefully for location.

LAYING TRACKS Install the T-slot tracks in the grooves with flat head screws countersunk into the track. The braces are attached to the fence by screwing through the face groove prior to attaching the T-slot track.

HOLD IT The hold-downs and stops are made from 3/4" hardwood. To make the guide to hold the stops square to the fence, cut a 1/16" x 1-1/8" rabbet on both sides of the inside face.

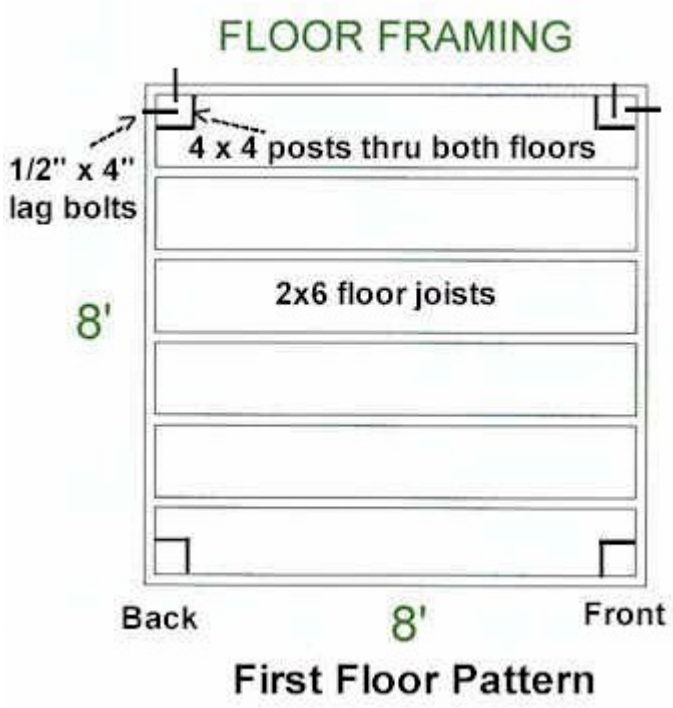
FORT PLAYHOUSE



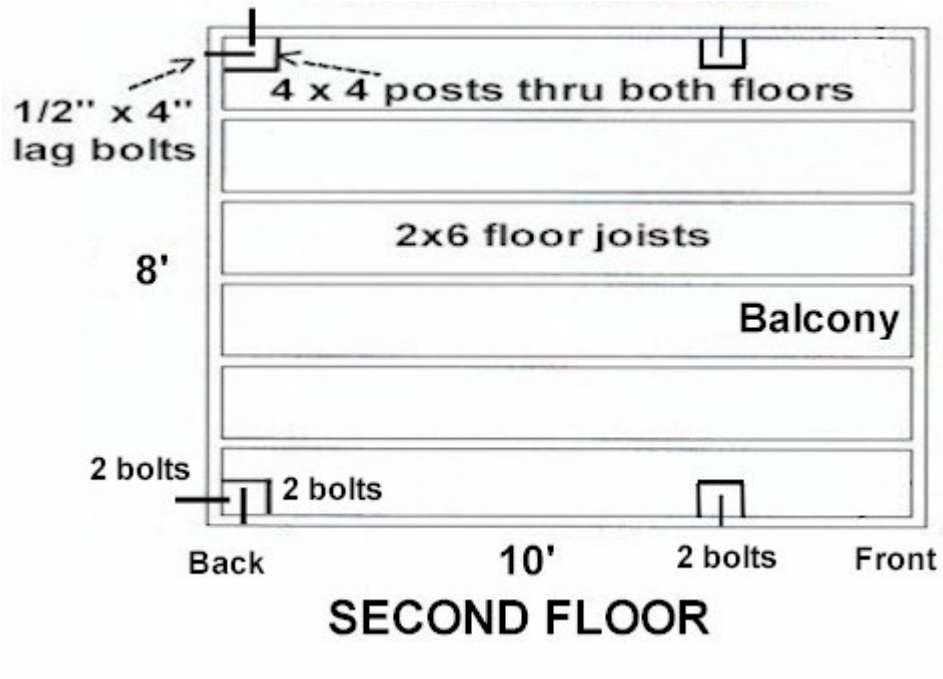
Step1: Frame 1st and 2nd floor system following diagrams shown. Use 2x6x8' pressure treated lumber and measure to have outside to outside dimensions exactly 8' x 8' on first floor, and 8' x 10' for the 2nd floor.

Step 2: The lumber and measurements on the next step will be determined by what you are going to do with this structure. If you will be making the bottom a storage shed, the height you will need will be taller than if it is a playhouse. For a children's playhouse use 4x4x10' PT lumber uprights. Measure 60" from one end (make that the bottom) and mark a line. This is the mark for the **bottom** of the second floor joists.

Step 3: Install 4 - 4x4x10' uprights to first and second floor framed sections following measurements given in step 2. Bolt these uprights in place with 2 - 1/2"x4" Galv. lag bolts at each attachment point. On corners place 2 on each side of the corner.



First Floor Pattern



SECOND FLOOR

Note: The easiest way to accomplish step 3 is to assemble the unit on it's side. Use a helper when lifting the structure to the upright position.

Step 4: With the unit in the upright position we are ready to level and brace it. Level the first floor on the ground. Using a level, temporarily plumb and brace the vertical uprights, while 45 degree braces are installed on the first floor that are shown in the picture. Cut these 24"

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long with a 45 degree angle in each end. Bolt these to the bottom of the second floor joists and the 4x4 upright as shown.

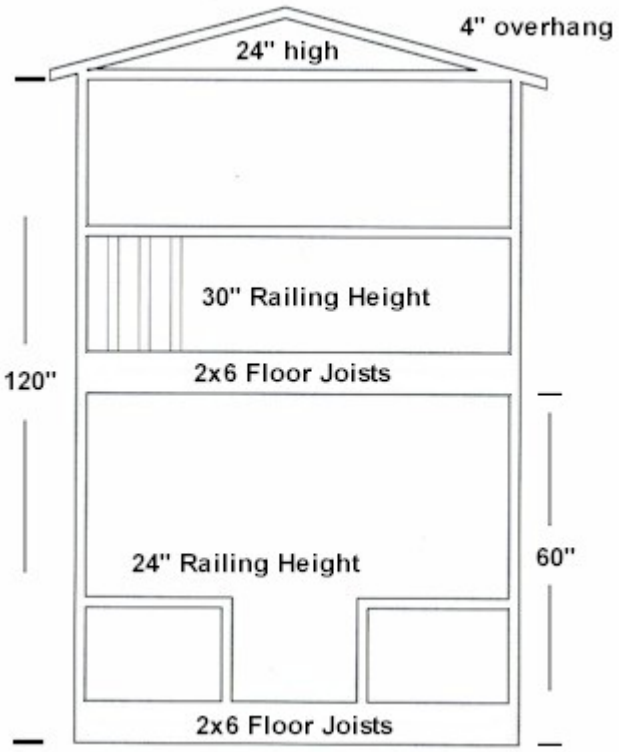
Step 5: Now it's time to install the plywood floor. Add 3 1/2" long nailers to the sides of the 4x4 uprights at the spot where the plywood floor meets the upright. (the cut out is necessary to allow the upright post to pass through the plywood floor). If you do not add these nailers the floor will be springy. Measure, cut and install the plywood floor on both floors. Use pressure treated 5/8" plywood if possible. (1/2" will work if 5/8" cannot be located)

Note: The extra 4x4's in the photo at the front entrance are optional (location A) . They are in place to hold the railing on both floors.

Another Note: This design uses a simple 2x4 ladder (location C) that is mounted in the back of the first floor. The ladder is vertical with a 16"x24" hole cut in the second floor plywood for the visitors to climb through. If you are building a shed in the bottom, you could place the ladder up the outside in the back and cut a section of railing out. Another choice is to have the entrance on the side of the front balcony.

Step 6: Install siding as shown, covering the floor joists as well as the railing area. The siding (location B) can be T-111 plywood siding (or individual fence boards). Siding on the gable ends (location E) use the same materials and instructions.

Note: The 45 degree braces on the second floor are 14" long.

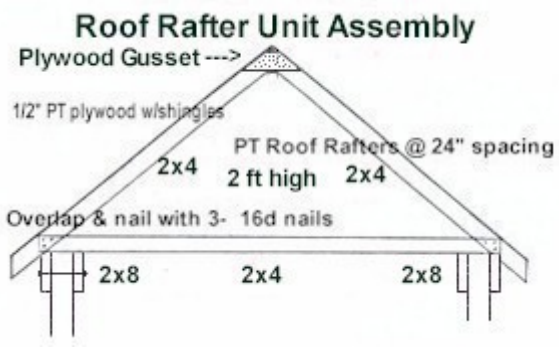


Step 7: Install railing on front balcony. This railing can be any style you desire. The picket style railing shown fits the rustic western theme of the entire structure.

The railing shown is simple to install. It uses the pickets as the supports...there are no corner supports holding the railing. Note in the photograph how the pickets are bevel cut at the bottom. They are securely fastened to the floor joists on 3 1/2" spacing. The top rail is two 2x6 boards nailed together in an "L" shape. The pickets are nailed in the crook of the "L" as shown. Miter cut the left and right corners of the railing.

Step 8: Measure, cut and install the roof. Start by installing the double 2x8 header on each side of the 4x4 uprights. Install header flush with the top of the 4x4's, and bolt assembly together with 1/2" x 8" galv. carriage bolt. Roof system uses 2x4 rafter assemblies on 24" centers with 1/2" plywood sheathing. Make 7 roof rafter assemblies following the measurements in the drawing below. Make these assemblies on a flat surface, and install them 1 at a time with 24" spacing from front to back of the playhouse. After all 7 assemblies are in place and temporarily braced, install the roof sheathing. Overhang the plywood roof sheathing 2 inches all around as shown in the pictures.

Install shingle molding on the outside of the gable ends, on top of the siding at the underside of the roof sheathing. (location F) Install roof shingles of your choice.



CHILDREN'S PLAY STRUCTURE

1. Raise the structure

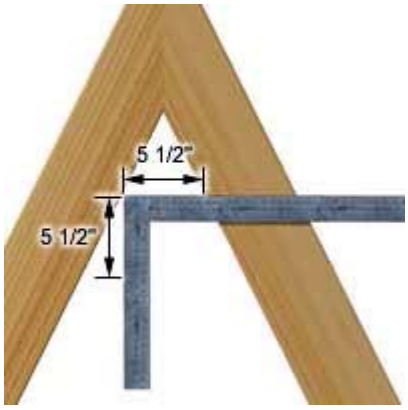
1.1 With stakes and strings, mark off the perimeter of the area where you will need to dig a 10 x 8 ft. (3 x 2.4 m)hole.

1.2 Excavate the entire surface to a depth of 6 in. (152 mm). At each corner (inside the perimeter) dig an 8 x 8 in. (203 x 203 mm) square ten inches (approx. 250 mm) deep for the structure's four posts, which will be driven in at a 63° angle.

1.3 Cut one end of each of the four 6 x 6 in. (152 x 152 mm) posts at a 27° angle. These posts will then be joined in pairs to form two peaks.

1.4 We suggest assembling the structure on the ground before placing it in the excavated area. Lay your two 6 x 6 in. (152 x 152 mm) posts flat on the ground to form a " V " and screw or nail them together.

1.5 Mark the two posts where the gap between them is 5 1/2 in. (140 mm). Mark again 5 1/2 in. (140 mm) lower, in line with the peak, at the centre of the two posts. This second line will mark the top of the beam support. As a precaution, leave an extra 1/4 in. (6 mm) clearance for easier insertion of the beam.



1.6 Cut the beam supports (a total of 4) out of 2 x 8 in. (50 x 203 mm) planks, cutting the ends at a 63° angle so that they align with the peak, along the posts (at 27°).

1.7 Bolt the supports to the posts or attach them using lag screws (two at each end).

1.8 Now place the two rafters sideways on the ground and insert the 6 x 6 in. (152 x 152 mm) by 14 ft.-long (4.3 m) beam into the two spaces provided so that they protrude by 36 1/2 in. (927 mm) at each end. Nail it at a 45° angle into the two support boards. Use wood scraps to make one or two blocking pieces that you will insert into the remaining (triangular-shaped) space. Toe nail them in.

1.9 Trace and cut out four gussets (pieces of wood to stop the legs spreading) from a 1/2 in. (13 mm) sheet of plywood. They will be used to close the two sides of each peak. Cut out a space at the base of each one to insert the beam. A head to tail layout on your plywood will limit the number of cuts and save plywood (see sheet 5/6 of the attached Planimage plan). Using an electric drill, screw in the gussets on each side of the posts.

1.10 Stand the structure upright and place it inside the perimeter, inserting the posts into the corners. Pack top soil around the base of the posts.

2. Make a sandbox

2.1 Spread a geotextile sheet over the entire excavated area.

2.2 Nail together the four 2 x 10 in. (50 x 254 mm) planks that will edge the sandbox and place them inside the perimeter (over the geotextile sheet) and resting against the posts at the four corners, without extending beyond the borders. According to this plan, your sandbox will be 9 1/2 x 7 ft. (2.9 x 2.1 m).

The border will be buried 4 in. (100 mm) into the ground. Backfill the outside.

2.3 Attach the four corners of the border to the four posts with lag screws.

3. Place the beams of the platform

3.1 Cut six 4 x 4 in. (100 x 100 mm) posts into 7 ft. (2.1 m) lengths. Using a table saw, make a notch 1 1/2 in. (38 mm) deep and 9 1/2 in. (241 mm) long at the bottom of the six posts.

3.2 Set the height of your circular saw blade at 1/2 in. (13 mm) before making a notch into the six posts, at 2 ft. 7 in. (0.8 m) from the unnotched end. On the four posts already notched, this second notch should be on one of the lateral sides in relation to the previous notch so that the two notches are on adjacent sides. More on the subject in the "corner posts" section on page 6/6 of the plan.

3.3 To make the roof, cut a 1/2 in. 4 ft. x 8 ft. sheet of plywood in two, to obtain two 2 x 8 ft. boards. Rip one of the long ends of each board at a 45° angle. Attach the two boards to each side of the beams to form the roof.

3.4 To build the platform beams, cut four 2 x 6 in. (50 x 152 mm) planks into 5 ft. 5 in. (1.7 m) lengths. In your plywood, cut out two boards 5 1/2 in. (140 mm) wide by 5 ft. 5 in. (1.7 m) long. Make two beams by inserting a plywood board between two 2 x 6 in. (50 x 152 mm) planks. Glue and bolt the three boards together (see page 6/6 of the plan).

3.5 Insert each beam into the lateral notches in the two corner posts and, using an electric drill, screw them in opposite the notches from outside the posts.

3.6 Place the notches at the bottom of the corner posts on the sandbox border and centre the frame between the structure posts (peaks).

Bolt to the structure and to the sandbox border.

4. Install the joists of the platform

4.1 Place metal hangers for the 2 x 6 in. (50 x 152 mm) floor joists on the beams so that once installed, they will be centered 12 in. (305 mm) apart.

4.2 Cut joists out of 2 x 6 in. (50 mm x 152 mm) boards. You will need seven 9 ft. (2.7 m) long joists for the ends. Also plan two other 9 ft. 7 in. (2.9 m) long joists for the ends.

4.3 Attach the joists to the hangers and double the border joists by attaching the two boards that make up the ends of the posts to the outside edges of the border joists.

4.4 To make the studs, cut three 4 x 4 in. (100 x 100 mm) posts into 3 ft. 1/2 in. (0.9 m) lengths. At one end of each, make a notch 2 in. (50 mm) deep and 5 1/2 in. (140 mm) long.

4.5 Position the two remaining 4 x 4 in. (100 x 100 mm) posts, placing the notches out, over the border joist before attaching them to the joists. The first post will be attached to the joist 26 in. (660 mm) from the outside end of the 6 x 6 in. (152 x 152 mm) post and the second 18 1/2 in. (470 mm) from the first measurement.

4.6 Use the same procedure to attach the three studs. Position the first stud 18 1/2 in. (470 mm) from the last stud attached in the preceding step, and the other two at the opposite end of the platform, each 26 in. (660 mm) from the outer edge of the 6 x 6 in. (152 x 152 mm) structure, on the border joist (notch out).

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5. Build the floor of the platform

5.1 Cut 1 1/4 x 6 in. (32 x 152 mm) boards into 6 ft. (1.8 m) lengths. Following this plan, you should require about fifteen of these boards.

5.2 Use an electric drill to screw the boards to each floor joist, leaving a 1/8 in. (3 mm) clearance between each.

To ensure uniform spacing, temporarily insert the tip of a 1/8 in. (3 mm) diameter nail into each joist.

5.3 Where there are posts, measure and mark the cutting line on the board. Use a jigsaw to cut the appropriate opening.

6. Add a railing to the platform

6.1 To build the railing, cut two 2 x 4 in. (50 x 100 mm) boards into 5 ft. 2 in. (1.6 m) lengths for the two sections that will be between the 6 x 6 in. (152 x 152 mm) posts. Cut the boards into 26 in. (660 mm) lengths for the four other sections.

6.2 Screw the long railing sections to the 4 x 4 in. (100 x 100 mm) posts at a 45° angle (the height of both being equal).

6.3 Cut 32 in. (810 mm) rails out of 2 x 2 in. (50 x 50 mm) boards. Make a 45 degree cut at one end of each for finishing. Calculate the number of rails required, keeping in mind that they will be centered 4 in. (100 mm) apart.

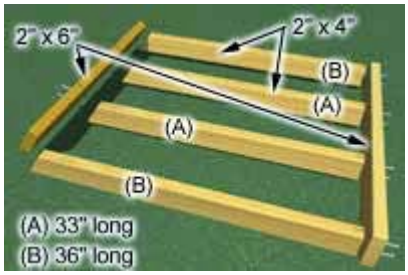
6.4 Attach the rails (bevelled end up) to the ramp and the border joist or post, as the case may be, screwing them in with an electric drill. Set them 1 1/2 in. (38 mm) from the top of the ramp. Make sure they are level.

7. Dress up the access ramp

7.1 Cut four 2 x 4 in. (50 x 100 mm) planks, two for the outside pieces, 7 ft. (2.1 m) long and the two others, for the inside pieces, 6 ft. 10.5 in. (2.09 m) long. Cut one end of all four pieces at a 54° angle. Cut two 2 x 6 in. (50 x 152 mm) planks, one to a length of 36 in. (914 mm) and the second 33 in. (838 mm) long. Bevel the ends of the 33 in. (838 mm) plank at a 54° angle.

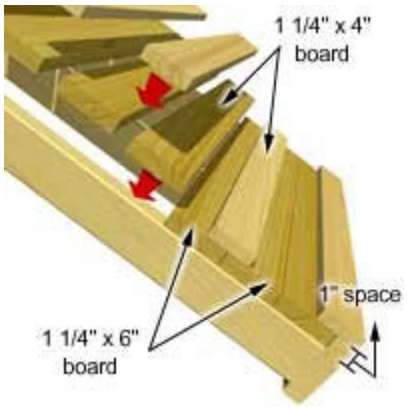
7.2 Build the access ramp upside down on the ground. Center the right angle ends of the 2 x 4 in. (50 x 100 mm) boards to the 36 in. (914 mm) long 2 x 6 in. (50 x 152 mm) board every 12 in. (305 mm).

Be sure to leave a 1 in. (25 mm) clearance on the 2 x 6 in. (50 x 152 mm) to attach the floor. House the 33 in. (305 mm) long 2 x 6 in. (50 x 152 mm) into the other end of the ramp and attach it to the 2 x 4 in. (50 x 100 mm).



7.3 Flip the assembled component right side up and screw it to the main structure. Working from the bottom up, finish the access ramp floor by nailing in 36 in. (914 mm) long 1 1/4 x 6 in. (32 x 152 mm) boards.

7.4 Starting at the ground section of the access ramp, attach 1 1/4 x 4 in. (32 x 100 mm) boards to every second floorboard, making sure to center the boards over the voids. These boards will be used as stairs for easier access to the structure's upper level.



8. Build the bridge

8.1 Out of two 2 x 6 in (50 x 152 mm) boards, make two 21 in. (533 mm) and two 18 1/2 in. (470 mm) long boards. Attach the two longest boards perpendicular to the sandbox border and to the ladder posts by screwing or nailing them in at a 45° angle.

8.2 Nail the two other boards perpendicular to the first two, equidistant from the ends and at a 45° angle.

8.3 Finish the floor the same way as for the platform floor, with four 22 1/2 in. (570 mm) long 1 1/4 x 6 in. (32 x 152 mm) boards.

9. Fix the ladder

9.1 Attach a 2 x 2 in. (50 x 50 mm) board to the top of the bridge.

9.2 Next, determine the height of the four 21 1/2 in. long (546 mm) 2 x 4 in. (50 x 100 mm) boards that will be used as steps by calculating the distance between the platform floor and the top of the 2 x 2 in. (50 x 50 mm) board attached at step 1. The steps should be evenly spaced.

9.3 Screw the steps to the posts with an electric drill.

10. Install the swings

10.1 In a 2 x 8 in. (50 x 203 mm) board, cut two 18 in. (460 mm) lengths and drill a hole 2 in. (50 mm) from each end, for the ropes.

10.2 For each swing, drill two holes at the centre of the beam, leaving a 4 in. (100 mm) space at the end of the beam. The two holes should be 14 in. (355 mm) apart. Bolt the two support hooks into the holes.

10.3 Thread the rope through the holes in the swing and tie securely.

10.4 Cut the rope so that the height between the ground and the top of the seat of the swing is 18 in. (460 mm).

Fill the base with sand, sit back, relax and watch the kids delight in your new creation!

Have a great summer!

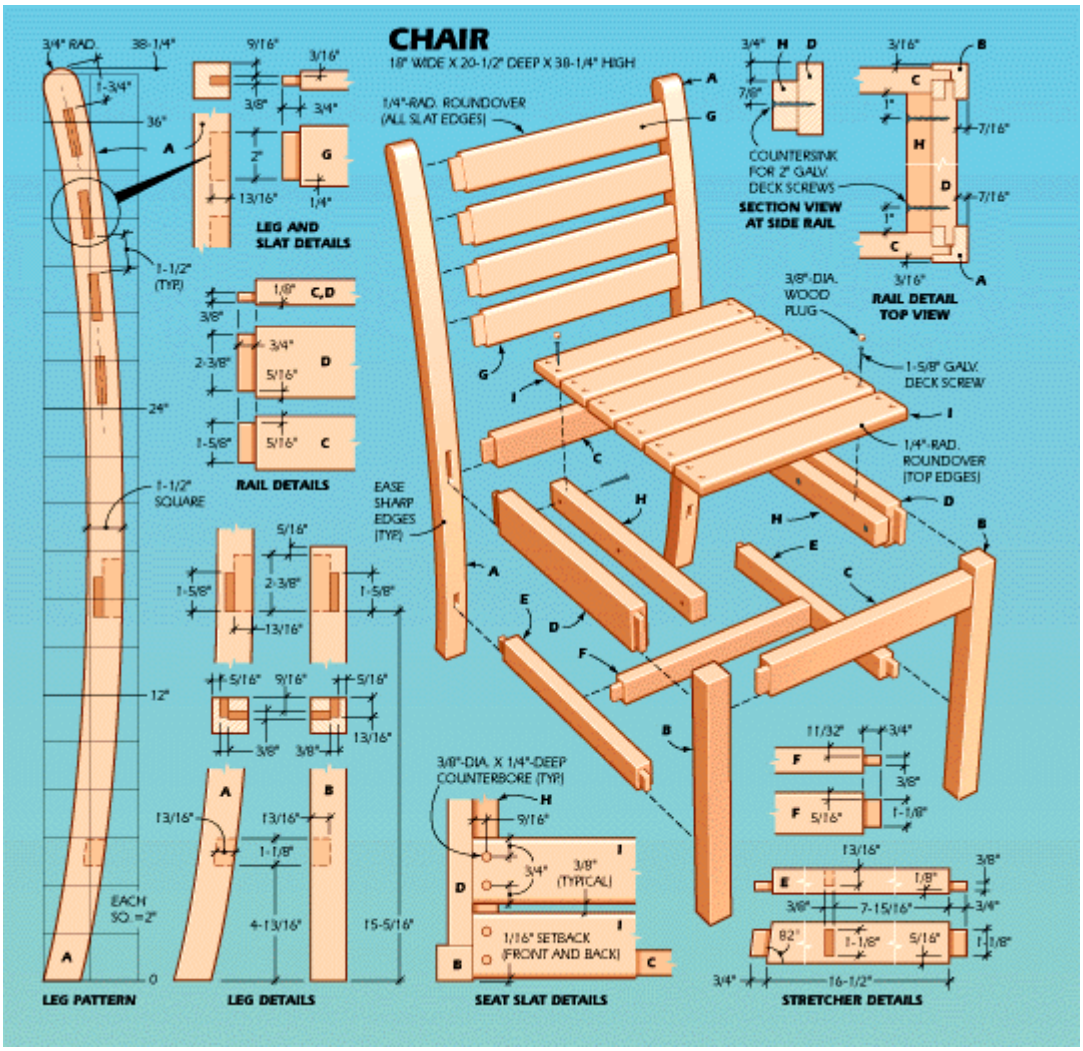
Tools list

- Carpenter's Pencil
- Carpenter's level
- Circular saw
- Drill
- Hammer
- Jig saw
- Safety goggles
- Shovel
- Speed Square
- Table saw
- Work gloves

Material list

- "Cool Wave " slide NE4675 (see Swing-N-Slide® Co.)
- 1 x 6 in. (25 x 152 mm) boards
- 1/2 in. (13 mm) plywood
- 2 x 10 in. (50 x 254 mm) planks
- 2 x 2 in. (50 x 50 mm) planks
- 2 x 8 in. (50 x 203 mm) planks
- 4 x 4 in. (100 x 100 mm) posts
- 6 x 6 in. (152 x 152 mm) posts
- Geotextile sheet
- Metal hangers
- Nails
- Sand
- Treated wood screws

OUTDOOR CEDAR TABLE AND CHAIRS



MATERIALS LIST—TABLE AND CHAIRS		
Key	**No.**	**Size and description (use)**
A	**2**	**1 1/2 x 3 1/2 x 38 1/4 in. cedar (leg)**
B	**2**	**1 1/2 x 1 1/2 x 18 in. cedar (leg)**
C	**2**	**1 1/16 x 2 1/4 x 16 1/2 in. cedar (rail)**
D	**2**	**1 1/16 x 3 x 17 in. cedar (rail)**
E	**2**	**1 1/16 x 1 3/4 x 18 in. cedar (stretcher)**
F	**1**	**1 1/16 x 1 3/4 x 16 1/2 in. cedar (stretcher)**
G	**4**	**3/4 x 2 1/2 x 16 1/2 in. cedar (slats)**
H	**2**	**1 1/16 x 1 3/4 x 16 in. cedar (cleats)**
I	**6**	**3/4 x 2 1/2 x 15 in. cedar (slats)**
J	**4**	**3/4 x 3 x 37 1 1/16 in. cedar (apron)**
K	**4**	**3 x 3 x 28 15/16 in. cedar (leg)**
L	**4**	**1 1/16 x 3 x 50 in. cedar (rail)**
M	**1**	**1 1/16 x 3 x 46 1/2 in. cedar (rail)**
N	**4**	**7/8 x 1 1/4 x 3 in. cedar (block)**
O	**9**	**1 1/16 x 5 1/4 x 50 1/4 in. cedar (slat)**

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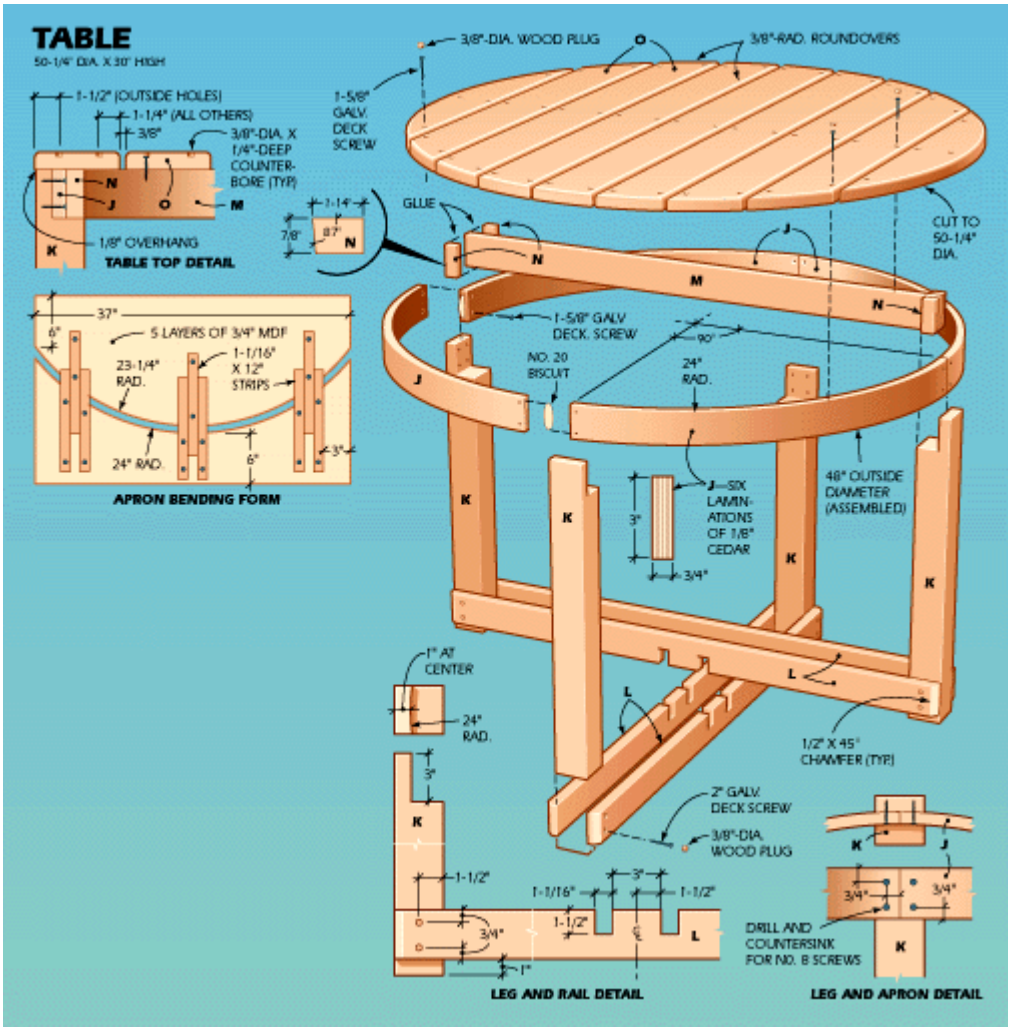
Misc: 1 5/8 in. and 2 in. galvanized deck screws, 3/8-in.-dia. wood plugs, No. 20 biscuits, Titebond II glue, two sheets 3/4-in. x 4 ft. x 8 ft. MDF, Cabot Clear Decking Stain No. 1400.



Building the Table

We used air-dried, clear red cedar for our project. While normally we use kiln-dried stock for woodworking, we couldn't locate kiln-dried material in the sizes we needed. Besides, using kiln-dried lumber is not that important for outdoor furniture because these pieces are subjected to wide variations in humidity. To stabilize the air-dried stock, we brought it into the shop and stacked it neatly in a dry space out of direct sunlight, with evenly spaced strips of wood between each board. This is known as stickering.

Start by making the laminating form. We chose MDF (medium-density fiberboard) for the form because it is inexpensive.

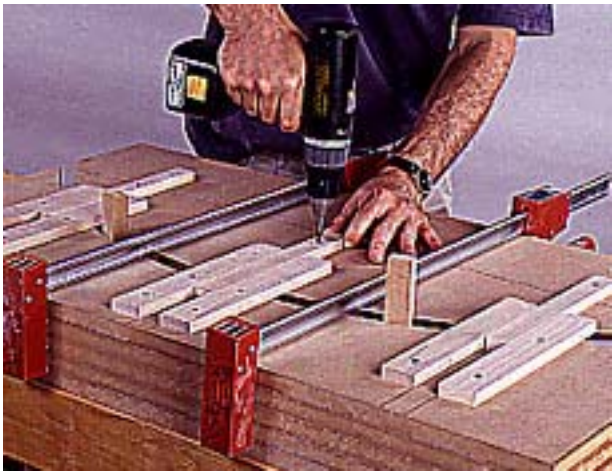
First, make the trammel base for the router. Install a 3/4-in.-dia. straight bit in the router, and bore a 3/8-in.-dia. hole through the trammel so that the hole's center is 24 in. from the outside of the router bit. Use a short length of 3/8-in. dowel to pin the trammel to a large piece of MDF. Now, make three passes with the router to cut an arc through the stock (**Photo 1**). Temporarily leave a section of the panel connected at each end of the arc. Make a set of alignment marks across the arc, and use the router to cut the panel into two sections. Use the two sections as templates. Cut slightly oversize blanks from the remaining panel stock. Screw a template to each blank, and use the router with a flush-trimming bit to cut the blanks to finished radius (**Photo 2**). Each routed piece becomes the pattern. To prevent glue from sticking to the form, apply a coat of varnish to it. Then wax it after the varnish dries.

1 Make the bending form template with a plunge router on a trammel arm. Cut an arc in a sheet of MDF.

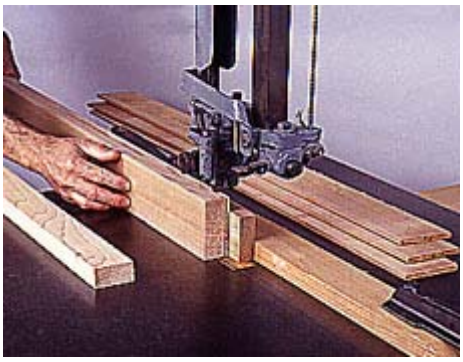
2 The remaining pieces of the form are trimmed to size using the template, router and flush-trimming bit.

Next, place 3/4-in.-thick blocks between the bending forms, and temporarily clamp the forms together. Fasten alignment strips to the surfaces of the forms (**Photo 3**).

Set up the band saw with a tall rip fence and a 1/2-in.-wide, four-tooth-per-inch blade. Rip 1/8-in.-thick, 48-in.-long cedar strips (**Photo 4**).



3 Use 3/4-in.-thick spacers between the bending form pieces. Clamp the form pieces together and fasten alignment strips.

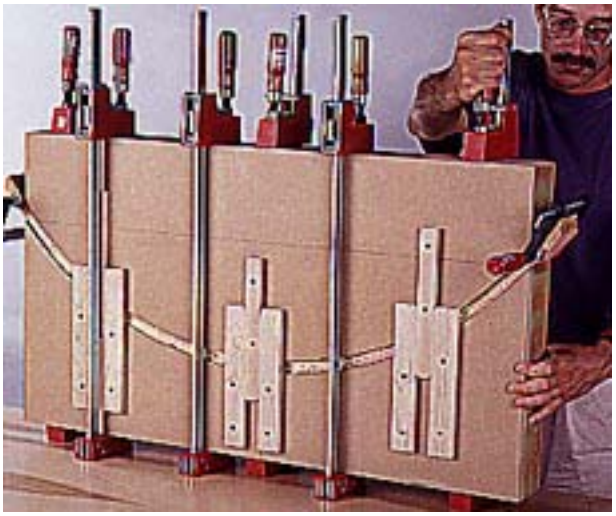


4 Resaw the 1/8-in.-thick apron laminate strips on the band saw. Use a pushstick at the end of the cut.

Spread glue on the strips, and place the six strips stacked in the form. Clamp the form together (**Photo 5**).

When all the apron blanks have been glued up, plane a square, straight edge on each blank, then rip the apron blanks to finished dimension.

Next, make a plywood cradle with a radius that matches the apron's finished outside length. Clamp the cradle to a long auxiliary fence attached to the table saw's miter gauge. The first cut removes one rough end from the apron (**Photo 6**). Turn the apron around, and crosscut the apron to finished length.

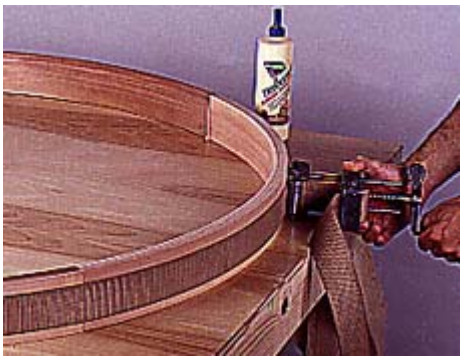


5 Clamp the laminate strips at either end to keep them from shifting. Apply pressure with equally spaced clamps.

6 Make a cradle. Then crosscut the apron blank to finished length. The apron length and cradle arc length are equal.

Use the cradle again to hold the apron as you cut the biscuit slot in each end (**Photo 7**). Assemble the apron. Then apply glue to the apron ends, the biscuit slots and the biscuits. Use a band clamp to apply clamping pressure (**Photo 8**). Check the apron diameter for distortion, and adjust it if necessary. Rip, joint and crosscut the leg stock to finished dimension. To cut the curved notch in the leg, first make a 90-degree cut and then use a sharp chisel to pare the curve.

7 Transfer the cradle to a bench, and use it to hold the apron section in place while cutting the biscuit slots.



8 Glue and clamp the apron sections together using a strap clamp. Check its diameter at several points.

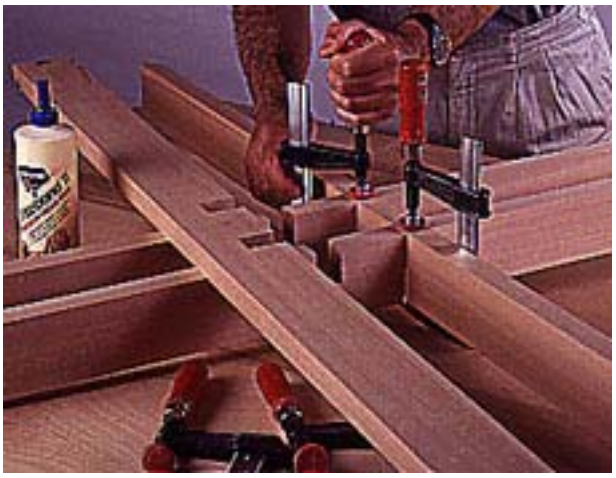
Rip, crosscut and notch the table rails and chamfer the edges. Spread glue on the notches, and clamp the pieces together (**Photo 9**).

Position a table leg between a pair of rails, and counterbore the screw holes. Fasten the legs and rails with galvanized deck screws.

Center a leg over each apron joint. Countersink the screw holes, and drive screws into each leg (**Photo 10**).

Now cut the crossrail to size. Place the crossrail into the leg assembly, and cut the glue blocks to fit at its ends. Glue the blocks in place.

Rip and crosscut the top slats to size. Use a rounding-over bit in the router to ease the slat edges. Clamp the center slat in position, bore its pilot holes and fasten it to the apron. Fasten the remaining slats to the center rail spaced 3/8 in.



9 Glue and clamp together the half-lapped rail assembly. Check that the parts are square to one another.

from each other. Mark out the top's diameter (**Photo 11**) and cut it to shape with a sabre saw. Sand the slat ends smooth, then use the router and rounding-over bit to ease their edges.

Use a plug cutter in your drill press to make the plugs to cover the screwholes. Glue the plugs over the screwheads, and use a chisel to pare the plugs smooth. Sand the table smooth with 120-grit sandpaper.

10 Position the apron so each of its joints is centered on a leg. Use four screws at each joint to attach the apron to the legs.

11 Space the boards equally, and screw them to the crossrail. Draw the outline of the top on the boards.

Chair Construction

The first step in chair construction is to make a thin plywood template for the rear leg. Rip and crosscut the rear leg blanks, then trace around the pattern onto the leg (**Photo 12**). Cut the outside of the leg to shape, and smooth its outline with a block plane (**Photo 13**). Cut its inside surface to shape, and smooth it with a spokeshave.

The other chair components are ripped, crosscut and planed to final dimension. Lay out the mortises and tenons on these pieces. The mortises are most easily cut with a router and a spiral up-cutting bit (**Photo 14**). This will require that you cut the ends of the mortises square with a chisel. However, this process will not work on the inside surfaces of the rear leg because the router fence does not have a straight edge to bear against. Cut these mortises by

12 The first step in building each chair is to make a template for the rear leg, and trace it onto the leg blanks.

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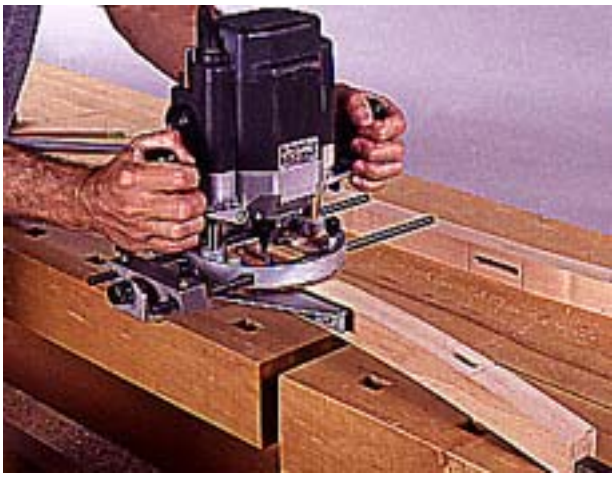
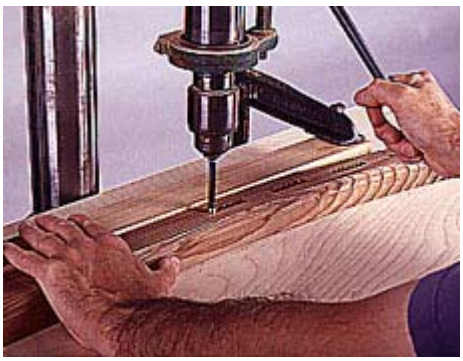
laying the leg against a fence on a drill press table. Bore a series of overlapping holes (**Photo 15**). Then cut the mortises square with a chisel.

13 Cut the outside curve on the leg. Clamp it to the bench, and smooth the curve with a block plane.



14 Use a plunge router with its fence positioned on the leg's straight face. Cut the side rail and stretcher mortises.



15 Remove the bulk of the side rail mortises on the drill press. Chisel the mortise sides and ends square.

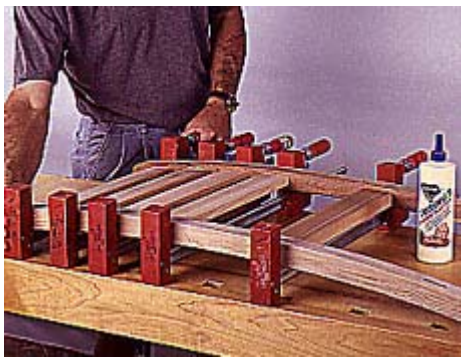
Cut the tenons on the back slats, rails and stretchers using a dado blade installed in the table saw (**Photo 16**). On the rails and stretchers, be careful to keep track of which face of the component you are working on because the tenon is not centrally positioned on these pieces. Adjust the height of the dado blade accordingly. Also, note that the tenon that joins the side stretcher to the rear leg has an angled shoulder. Cut this by hand using a dovetail saw or backsaw.

Begin the final assembly by gluing and clamping together the side stretchers and the cross stretcher (**Photo 17**). Measure diagonally from both corners of the assembly to check it for square. Next, glue and clamp together the rear legs, slats and rail (**Photo 18**). Glue and clamp the front legs and rail. Then, glue and clamp together all the subassemblies (**Photo 19**). Cut and install the cleats and the seat slats. Install wood plugs.

The chairs and tables were finished with a clear coat of Cabot Decking Stain No. 1400.

16 Clamp a stop to the miter gauge fence. Use a dado blade to cut the tenons on the rails, stretchers and back slats.

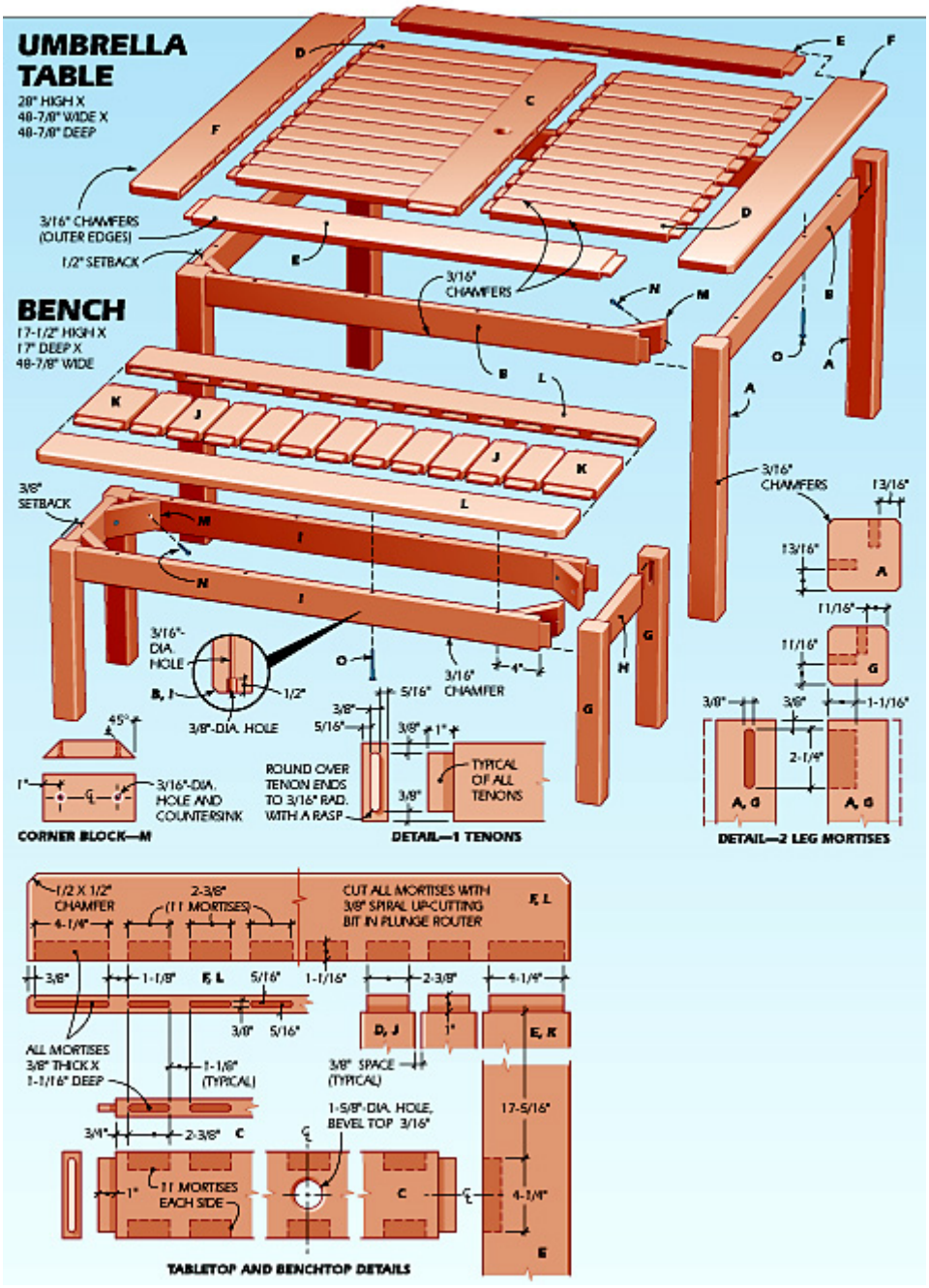
17 Glue and clamp together two side stretchers with a cross stretcher. Check the assembly for square.



18 Clamp together the rear legs, a rear rail and four back slats. Use one clamp at each joint location.

19 Glue and clamp together the rear leg subassembly, the front legs and the stretcher subassembly.

OUTDOOR TABLE AND BENCH



MATERIALS LIST--UMBRELLA TABLE AND BENCH		
Key	No.	Size & Description (use)
A	4	2 3/4 x 2 3/4 x 27" cedar (leg)
B	4	1 x 3 x 43 7/8" cedar (apron)
C	1	1 x 5 x 40 7/8" cedar (rail)
D	22	1 x 3 1/8 x 18 15/16" cedar (slats)
E	2	1 x 5 x 40 7/8" cedar (rail)
F	2	1 x 5 x 48 7/8" cedar (stile)
G	16	2 1/4 x 2 1/4 x 16 1/2" cedar (leg)
H	8	1 x 3 x 12" cedar (apron)
I	8	1 x 3 x 44 7/8" cedar (apron)

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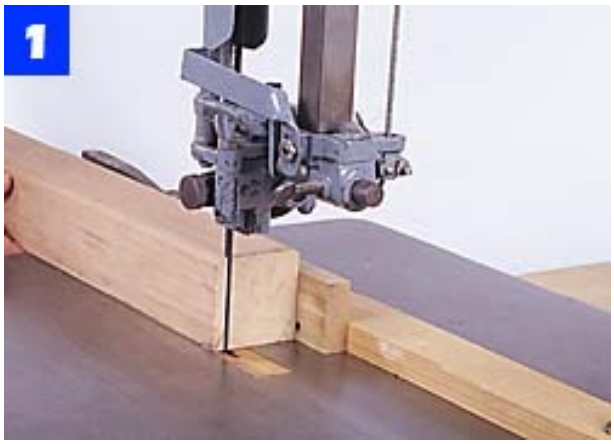
J	44	1 x 3 1/8 x 9" cedar (slats)
K	8	1 x 5 x 9" cedar (rail)
L	8	1 x 5 x 48 7/8" cedar (stile)
M	20	1 x 2 3/4 x 5 1/4" cedar (block)
N	40	2" No. 8 fh galvanized screw
O	48	3" No. 8 fh galvanized screw

Making The Parts

The table legs are cut from 4 x 4 stock (or they can be glued up from thinner material). When using 4 x 4 stock, cut each leg to rough length. Next, clamp a fence to the band saw table, and rip the blanks to a 2 3/4 x 2 3/4-in. square **(Photo 1).** Then clamp the leg to a workbench, and use a razor-sharp plane to remove the saw marks **(Photo 2).** Unless you are very experienced with a hand plane, check the workpiece frequently as you go. The edges of the leg must remain square to one another. Remember that you are only smoothing the surface, so do not remove too much material.



Rip the table leg stock out of a cedar 4 x 4. Clamp a temporary rip fence to the band saw table to do this.

Clamp a table leg to a benchtop and remove saw marks with a hand plane. To make a smooth cut, push the plane at an angle.

Use a miter gauge on the band saw to crosscut the leg blanks to finished dimension **(Photo 3).**

Since the bench legs are smaller than the table legs, it is a better use of materials to glue them up from three pieces of 3/4-in.-thick stock. You can simplify the job if you plan to make the blanks large enough to cut four legs from each glued-up stack.

Crosscut the legs on the band saw. Here, a shopmade crosscutting table and a miter gauge are used to make the cut.

Rip and crosscut material for the leg blanks slightly oversize, then use a foam roller to spread glue on the mating surfaces of each piece. Assemble the pieces into a stack, and clamp the pieces together **(Photo 4).** After about 20 minutes, scrape off the glue that has squeezed from the joints, then allow the glue to fully set.

For the bench legs, spread glue on 3/4-in.-thick stock. Lay disposable material under the pieces and clamp them together.

Now use the table saw to rip the blanks to 21/4 in. wide, and crosscut the bench legs to finished length.

Lay out the mortise locations in all the legs for the apron joints. You can speed the process by clamping four legs together with their ends perfectly aligned. Then, mark across the stack using a square **(Photo 5).** Next, use the router and edge guide to cut the leg mortises **(Photo 6).** It's best to use a spiral up-cutting bit in the router because that type of bit pulls the dust and chips out of the cut, and reduces the strain on the motor. This also keeps the bit's cutting edge cooler.

Rip and crosscut the individual bench legs to size, and then clamp them together. Mark out mortise locations on the legs.

Using a spiral up-cutting bit in a plunge router, cut the table leg mortises. Two legs clamped together provide a stable base.

Rip and crosscut 1-in.-thick stock for the table and bench aprons as well as for the top frames and slats. Install dado blades in the table saw, and then use the miter gauge to guide the workpiece over the saw blades when cutting tenons **(Photo 7).** Note that you can use the rip fence as a stop to gauge the tenon length. Since the tenons are 1 in. long, you need to make two passes to complete each cheek.

Use a dado blade setup in the table saw to cut the tenons on the apron pieces. Butt each apron to the fence, and make the cut.

Cut the tenons across the width of each workpiece, then adjust the blade height and move each workpiece over the blade on edge to cut the shoulder **(Photo 8).** Clamp each workpiece upright in a vise and gently round over the tenon's edges using a wood rasp **(Photo 9).**

To cut the shoulders on a tenon, stand the apron up, and hold it firmly to the miter gauge. Butt it to the fence and make the cut.

Round off a tenon with a rasp. The tenon’s radius matches the radius left by the spiral up-cutting bit used to cut the mortise.

Lay out the mortise locations for the tabletop and benchtop joints. Use a router with an edge guide and a spiral up-cutting bit to cut the mortises **(Photo 10).** It is best to clamp three workpieces of the same width together when routing to form a wide and stable base for the plunge router.

Mark the location of the umbrella posthole in the center rail of the tabletop, and then use a Forstner bit in the drill press to bore the hole.

After laying out the locations of the holes in the aprons for mounting the top, use a Forstner bit in the drill press to counterbore a recess for each screwhead. Next, use a 3/16-in.-dia. bit to drill the pilot holes for the screw shanks. Each of these holes is centered in a recess.

To cut the long row of mortises in each stile and rail, clamp three of the work-pieces together to support the router.

To complete the part-making process, install a chamfer bit in the router table, then use it to cut the 3/16-in.-deep chamfer on the table and bench legs, aprons and top parts as shown in the plans **(Photo 11).** Note that not all edges are chamfered.

Use a chamfer bit in the router table to cut the chamfer on all four edges of the legs for the benches and table.

Assembly

Begin assembly with the benches, since they are smaller and are much easier to work with. After you refine your technique on them, you can assemble the table.

It's worth noting that all the parts for the table and benches should be dry assembled before glue is applied. With the assemblies joined in this manner, make reference marks and numbers on the backs of the parts or in some other discreet location. Before proceeding to gluing and clamping, gather the parts together in batches so they are not confused during the assembly process. In some cases, you'll want to make a second dry fit midway through the assembly process, such as when gluing and clamping a stile or rail to multiple slats that have been glued to a stile or rail on the opposite side. This is a necessary evil to ensure that the parts go together smoothly--the parts may have fit the first time you tried them but shifted slightly when they were glued up as a subassembly.

Glue and clamp together a pair of bench legs and one short apron. Make two of these subassemblies.

Apply glue to the mortises of two bench legs and on the tenons of one short apron. Use a small wood shim to spread glue on the mortise walls, and use a small brush to coat the tenons. Press together the apron and legs, and

then clamp the subassembly to pull the joints tight **(Photo 12).**

When the glue is dry on these parts, glue and clamp the long bench aprons to the end subassemblies **(Photo 13).** It's best to do this on a flat work surface to ensure that the base assembly is not twisted.

Assemble the table base in the same manner as the bench bases. Make two subassemblies consisting of a pair of legs and one apron. When the glue has set on these, join the subassemblies spanned by a pair of aprons.

Join two leg-apron subassemblies spanned by a long pair of aprons. Glue and clamp this to complete a bench base.

Now move on to assembling the benchtops. Since there are several slats in each top, assemble each top in stages. First, glue and clamp the slats to one long rail **(Photo 14).** After the glue sets on those joints, apply the opposite rail.

The first stage in assembling a benchtop is to glue and clamp slats to one stile. Use one clamp in the center of each slat.

Multiple subassemblies are made in assembling the tabletop. First, slats are joined to the center rail.

Approach the tabletop assembly in the same manner. Begin by gluing and clamping a slat at each end of the center rail. Fill in between these two slats with more slats **(Photo 15).** When the glue is dry on this subassembly, glue and clamp slats to the opposite side **(Photo 16).** Next, glue and clamp the side rails to this subassembly **(Photo 17).** When the glue is set on that subassembly, position clamps across it and then glue and clamp one stile to it **(Photo 18).** Complete the top by gluing and clamping the second stile.

A second set of slats is glued and clamped to the center rail. Again, use one clamp in the center of each slat.

Using this technique, you will not have to worry about getting all the parts together before the glue begins to set. Your results will be better, and the stress of a frantic assembly is eliminated.

Glue and clamp a side rail to the center rail. One clamp, carefully centered, should provide enough force.

Mark the benchtops and tabletop for the 45 degree corner cuts, and make these cuts with a sabre saw. Sand the cut corners smooth, then use the chamfer bit in the router to shape the table edges and benchtops. Use the router and chamfer bit to shape the top edge of the umbrella hole as well.

Clamp one stile at each end of the top subassembly. Space clamps evenly and at the center of a tenon.

Rip, crosscut and miter the 1-in.-thick stock to make corner blocks. Bore and countersink pilot holes in each block, and then attach them with screws to the aprons for the table and benches **(Photo 19).**

A corner block is installed at each leg on the table and the benches. A pair of screws holds each block to the aprons.

Invert the tabletop on a padded surface, then place the base over it. Adjust the base so there is an even reveal on all sides of the top, and then attach the base to the top with screws **(Photo 20).** Assemble the benches in the same manner.

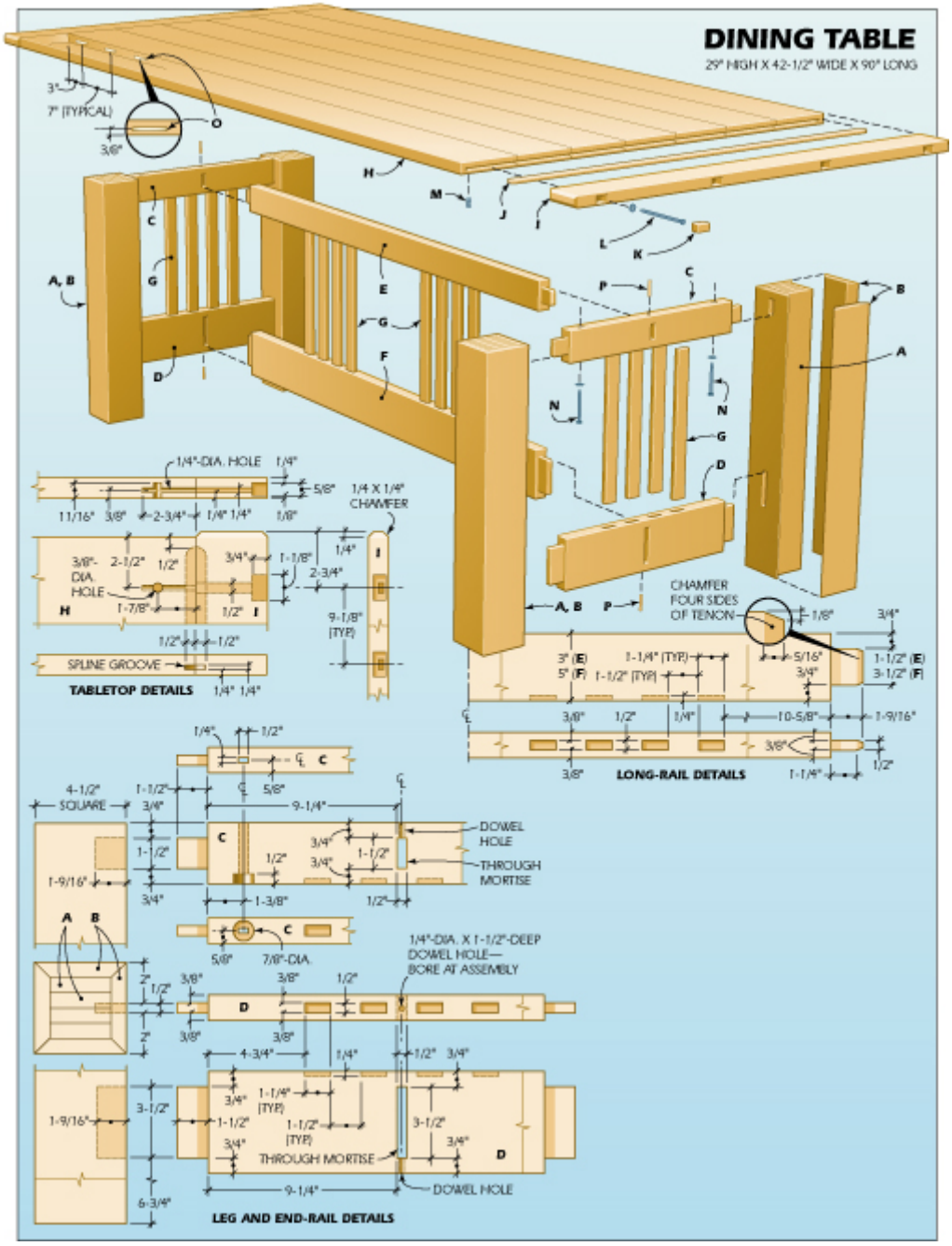
Attach the tabletop to the base with several screws. Drive each screw into its matching counterbored hole in the apron.

Sand all surfaces with 120-grit and 140-grit sandpaper, and remove all dust with a tack cloth. While cedar is resistant to rot and insect infestation, it will weather if left untreated. To preserve its natural color and protect it from the elements, apply a penetrating finish with a high-quality brush.

A pigmented stain could easily be used on this project. In fact, pigmented finishes provide greater protection against weather damage--even if they do obscure the wood's grain. Although most people prefer white, green or redwood-colored finishes for outdoor wood furniture, there's nothing to prevent you from being a bit more creative. The finish could be color matched to other outdoor furnishings, or to the house itself.

For maximum protection against the elements, use a paintable water-repellent preservative, followed by a compatible primer and topcoat. Visit your paint store to buy these three products and check that they are fully compatible.

OAK DINING TABLE



MATERIALS LIST--DINING TABLE		
Key	**No.**	**Size and description (use)**
A	16	3/4 x 3 x 28" oak (leg core)
B	16	3/4 x 4-1/2 x 28" oak (leg face board)
C	2	1-1/4 x 3 x 22" oak (end top rail)
D	2	1-1/4 x 5 x 22" oak (end bottom rail)
E	1	1-1/4 x 3 x 55 7/8" oak (long top rail)

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F	1	1-1/4 x 5 x 55-7/8" oak (long bottom rail)
G	16	1/2 x 1-1/4 x 14-1/2" oak (slat)
H*	1	1 x 42 x 83" oak (top panel)
I	2	1 x 3-1/2 x 42-1/2" oak (breadboard end)
J	2	1/4 x 1 x 41" oak (spline)
K**	8	3/8 x 5/8 x 1-1/8" oak (plug)
L	8	1/4"-20 x 5" rh machine screw, washer
M***	8	1/4"-20 steel cross dowel
N	4	1/4"-dia. x 3" lagscrew, washer
O	as reqd.	No. 20 joining plate
P**	4	1/4"-dia. x 1-1/2" dowel
Misc.: Medium Fumed Oak aniline dye (No. W1190) available from Woodworker's Supply, 5604 Alameda Place N.E., Albuquerque, NM 87113; Waterlox Original Sealer/Finish (Waterlox Coatings Corp., 9808 Meech Ave., Cleveland, OH 44105).		
* Overall size, laminate from available stock.		
** Finished dimension. Cut oversize and trim flush.		
*** Cross dowel (No. 31823)		

Leg Construction

Each leg is formed by surrounding a solid core with mitered face boards. First rip stock for the leg cores, using up any wood that has defects in its appearance. Crosscut these boards a few inches longer than finished length. Spread glue, assemble them in stacks of four, and apply clamps. After about 20 minutes, scrape off glue that has oozed from the joints. Secure a tall auxiliary fence to the table saw rip fence and clamp a holddown featherboard to the auxiliary fence. Set the table saw blade at 45° and rip bevels along both edges of each face board (Photo 1). Then, crosscut the boards to match the cores.

With a featherboard holding the stock against the table, rip a 45° bevel on both edges of each leg face board.

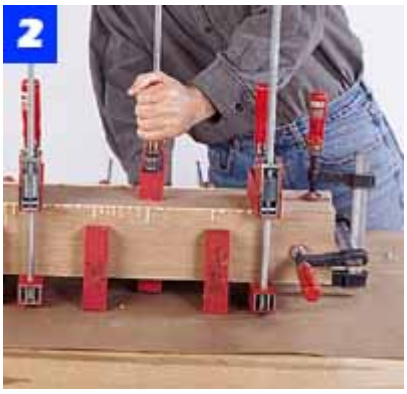
Apply glue to the face-board mating surfaces and to all sides of a core for one of the legs. Assemble the leg, alternating clamp direction so that even pressure is applied on all sides (Photo 2). Construct the remaining legs in the same manner and scrape off excess glue after about 20 minutes. When the glue is dry, use a band saw and miter gauge to crosscut the legs to finished length.

Lay out the leg mortises as shown in the drawing. Then, use a plunge router with a spiral up-cutting bit and edge guide to cut them (Photo 3). Take two or three passes to reach the full mortise depth so you don't burn the bit or overload the router. Square the ends of the mortises with a sharp chisel.

The Rails And Slats

Use a dado blade in the table saw to cut the rail tenons (Photo 4). Since the blade will leave small ridges, it's best to cut the tenons about 1/32 in. oversize and then pare to the exact size. Clamp a stopblock to the saw table to set the tenon length. Hold the rails on edge to cut the shoulders at the top and bottom edges. Use a sharp chisel to pare the small ridges off the faces of each tenon.

Lay out the through mortises in the end rails and use a 7/16-in.-dia. bit in the drill press to bore slightly overlapping holes that remove most of the waste from each mortise (Photo 5). Use a sharp chisel to finish cutting the joints (Photo 6). Work halfway through the joint from one face, then turn the rail over to finish from the other side.



Spread glue on joint surfaces and clamp the face boards to the leg core. Alternate clamp directions to pull the joints tight.

Rout the leg mortises with a spiral upcutting bit. Reach finished depth in several passes to reduce router strain.

Use a dado blade in the table saw to cut the rail tenons. A stopblock clamped to the table ensures consistent cuts.

Using a 7/16-in.-dia. bit, bore slightly overlapping holes to remove most of the waste from the end-rail mortises.

Finish the through mortises with a sharp chisel. Work halfway through from each face to avoid tearing the wood surfaces.

Use a sharp chisel or block plane to chamfer the ends of the tenons that extend through the end-rail

Test fit each through tenon in its mortise. Mark around each tenon end to indicate the outer surface of the rail. Using this line as a guide, chamfer the tenon ends (Photo 7). Rip and crosscut the base slats to size and lay out the slat locations on the rails. Use the plunge router with edge guide to make the cuts (Photo 8). Clamp two rails together to provide a wider base for the router. Square the ends of each mortise with a chisel, and test fit the slats.

Next, mark the hole locations in the end top rails for fastening the tabletop. Use a Forstner bit to counterbore the recess for each bolt head (Photo 9), and then bore two side-by-side 1/4-in.-dia. holes for each bolt. Use a sharp chisel to remove the waste between the holes, leaving elongated slots. These wide bolt holes will allow the top to move with seasonal changes in humidity.

Base Assembly

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Begin assembly of the base by joining the slats to the

mortises.

Lay out the slat locations in the rails and rout the mortises. Clamp two rails together to form a base for the router.

Use a Forstner bit and drill press to counterbore recesses for the lagscrews in the bottom edges of the top end rails.

end rails. It's not necessary to use glue unless the slats are too loose. Use two clamps to hold the assembly together until it's joined to the legs (Photo 10).

Spread glue in the leg mortises and on the rail tenons for one end of the table. Join the end rails to the legs, apply clamps, and compare opposite diagonal measurements to be sure that the assembly is square (Photo 11). Then, let the glue cure and repeat the procedure for the other table end.

Join the slats and long rails, install clamps and then compare diagonal measurements. Spread glue on the through-tenon joints and assemble the table base. Use clamps on either side of the through tenons to apply even pressure (Photo 12).

Bore holes through the top rails and into the through tenons for dowels that will secure the joints. Apply glue and drive each pin into place (Photo 13). Cut off the dowel about 1/16 in. above the rail surface and use a sharp chisel to pare it flush. Turn the base over and install dowels through the bottom tenons.

Assemble the end rails and slats. Use two clamps to hold the pieces together until the rails are glued to the legs.

Join the end assembly to the legs and clamp. Compare opposite diagonals to be sure that the assembly is square.

Assemble the slats and long rails and glue the long rails to the ends. Use clamps to pull the joints tight.

Lock the tenons to the rails by gluing a dowel through the joint. Turn the base over and repeat on the bottom joints.

The Tabletop
Select the stock for the tabletop, rip the boards to width, and crosscut a few inches longer than finished length. Plane or joint the edges of each board so they're straight and square, and then lay out joining-plate slots spaced about 7 in. on center. When cutting the slots, hold both the plate joiner and board tightly to your worktable so the slots will be accurately positioned.

Since the boards are long and heavy, it's best to begin assembly by joining only two. Then, after the glue cures, add one board at a time until the panel is complete. Use clamps every 6 to 8 in. along the joint to pull the boards together. After about 20 minutes, scrape off the excess glue, then wait another 30 minutes before adding the next board (Photo 14).

Begin assembly of the top by joining only two boards. After the glue cures, add one board at a time to reach full width.

While the joining plates will ensure a reasonably flat panel, you'll need to plane the top to achieve a truly smooth and even surface. Use a jointer or jack plane to level the top. Make sure that the plane is razor-sharp, and work diagonally across the panel, taking light cuts (Photo 15). Use a cabinet scraper parallel to the grain to remove the plane marks, and then plane the edges parallel and to finished width.

Use a jointer or jack plane to flatten the panel. Set the plane to take a very light cut, and work diagonally across the top.

Cut the top 1/2 in. longer than its final dimension with a circular saw or sabre saw. To make the finished cuts, first mount a 1/2-in. shank, top-bearing template bit in your router. Clamp a straightedge guide across the top panel, 1/4 in. from the end, and double-check that it's square to the panel edge. Then trim the end, allowing the router bearing to follow the straightedge guide (Photo 16). Use a scrap block clamped to the edge of the panel to prevent tearout at the end of the cut. Trim the opposite end using the same technique.

Rip and crosscut the two breadboard ends to finished size. Next, use a sharp block plane to cut the chamfered profile on the ends of each strip.

Use a slotting cutter to rout the 1/4-in.-wide x 1/2-in.-deep spline groove in the ends of the top panel. Note that the groove stops short of the panel edges. Use the same bit to cut a matching groove in one edge of each breadboard end.

To trim the ends of the tabletop, use a router with a routing bit that follows a straightedge clamped to the

Cut a spline with a 1/2-in. radius on the ends for each breadboard-end joint. Fit each spline into its groove in the top panel (Photo 17), install the breadboard ends and temporarily clamp them in place. Using a doweling jig and a long 1/4-in.-dia. bit, bore holes for machine screws that will fasten the breadboard ends to the top panel (Photo 18). When that's done, turn the top panel upside down and bore holes for the steel cross dowels using a brad-point bit with depth stop.

Remove the end pieces and use a sharp chisel to widen the four holes in each to 1/2-in. slots. Then, use a router

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with edge guide to cut a mortise centered over each hole. Square the ends of the mortises with a sharp chisel as shown in the drawing.

workpiece.

Cut splines for the breadboard-end joints. A 1/2-in. radius on the ends matches the slot profile.

Clamp the breadboard end to the tabletop and use a doweling jig to bore through the strip into the end of the top.

Install the steel cross dowels, aligning the holes with the machine screwholes. Then tighten the screws.

Assemble the breadboard ends and the top panel, but don't use any glue on the joints. Insert a cross dowel in each tabletop hole, aligning the hole in the dowel with the machine screwhole in the breadboard end (Photo 19). Install the screws and washers to hold the ends in place.

Cut small blocks to plug the mortises over the screwheads, and glue the blocks in place (Photo 20). Let each block protrude from the edge of the strip. When the glue has cured, use a small block plane to trim the blocks flush.

Set the tabletop on the base, adjust it for proper overhang on all sides, bore pilot holes and install the 3-in. lagscrews and washers. Then, remove the top and sand all table surfaces to 220 grit.

Finishing

We stained our table with a water-based aniline dye. To prepare for staining, wipe all surfaces with a damp sponge to intentionally raise the grain. When the wood is dry, lightly smooth the table with 220-grit sandpaper.

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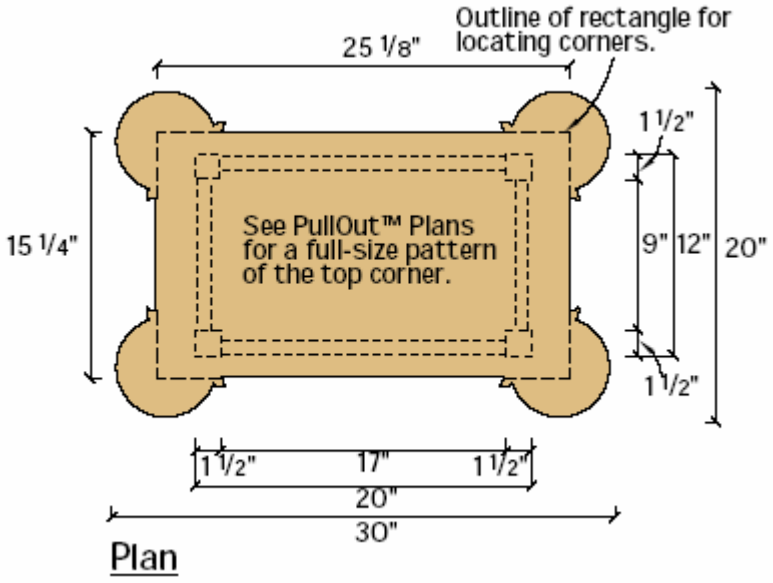
Cover the screwheads with small blocks glued into squared recesses. After the glue cures, trim the blocks flush.

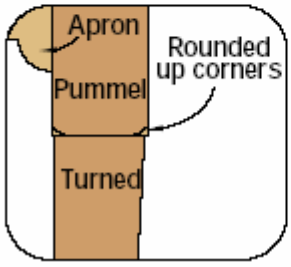
Apply the dye solution with a brush or rag, working quickly to avoid lap marks. Let the table dry overnight before applying the first coat of finish. If the wood surface is still a bit rough, lightly wipe with 320-grit sandpaper. Don't sand aggressively or you'll create light patches in the dyed surface. Clean with a tack cloth before proceeding.

We finished our table with four coats of Waterlox Original Sealer/Finish. Brush or wipe on the first coat and let it dry overnight. Lightly sand with 320-grit paper and remove all dust. For the remaining coats, let the finish sit on the wood for about 30 minutes, wipe off all excess, and let it dry over-night. When the last coat has fully cured, burnish with 4/0 steel wool and polish with a soft cloth.

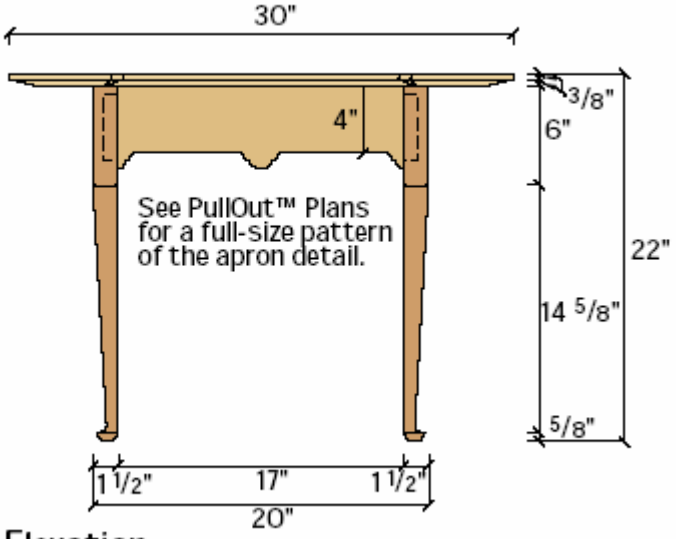
QUEEN ANN SIDE TABLES



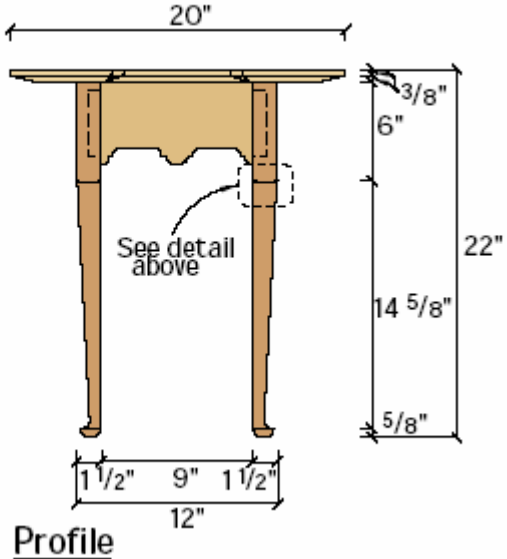
Plan



Detail of leg transition at top of turning



Elevation



Profile

Schedule of Materials: Queen Anne Side Tables			
No.	Item	Dimensions	Material
1	Top	3/4" x 20" x 30"	Maple
4	Legs	1-1/2" x 1-1/2" x 21-1/4"	Maple
2	Long Aprons	3/4" x 5" x 18-3/4"	Maple
2	Short Aprons	3/4" x 5" x 10-3/4"	Maple

Making Aprons • These tables were made with simple mortise-and-tenon construction. Start by cutting the apron parts according to the Schedule of Materials. Next cut the 3/8" x 4"-wide x 7/8"-long tenons on the ends of the aprons.

Making Pockets • The last thing to do on the aprons is to drill the pocket holes for attaching the base to the top. Do this on a drill press with a 1-1/4" Forstner bit. Use a shop-built jig to hold the aprons in place for drilling.

Leg Blanks • Although the legs look complicated, they are not. The secret is an offset turning technique. First cut the blanks 1/8" longer than in the schedule. This gives you some room to work with when turning the pad on the end of the foot.

Use a straight edge to make an "X" from corner to corner on both ends of the blank. This will aid in finding the center as well as marking the offset. Now, on the bottom of the legs, determine which corner will face out. On the bottom of each leg, measure 1/2" from the center to the corner opposite the outside corner. This is the offset for the leg. Remember, the farther away from the center you go, the thinner the ankle (the area just above the pad) will be. Going any farther than 1/2" is dangerously close to having a leg pop off your lathe.

Mark a line completely around the blank 6" down from the top of the blank. To save time roughing the blank, lay out a 1-1/2" diameter circle on the bottom of the blank. Set your jointer to 45 degrees. Using the circle as a guide, lower the infeed table to the point where you can take the corner off, leaving about 1/32" to the circle. Go slow and joint to within 1/8" of the line where the turning starts. Now mount the blank in the lathe.

After mounting a blank between centers with the top towards the drive center, cut a small kerf at the line where the turning stops. Don't cut too far or you won't be able to remove the kerf. With a roughing gouge and skew chisel, turn a cylindrical blank from the saw kerf to the foot. At this point use a skew chisel round the corners of the pummel, the square part of the leg, where it meets the turned portion. Repeat on all the legs and you're ready to do the offset turning.

Turning the Offset • Before resetting the legs, measure up from the bottom 1/8" and from that mark another 5/8". Turn the lathe on and follow the marks around with a pencil. Take a parting tool and set it on its side. Cut a small incision at the 5/8" mark . This creates a shadow line from which to begin the offset turning. Set the lathe for its lowest speed and reset the tailstock so the leg center is mounted in the offset mark. This might look like an awkward setup but as you remove material the leg will turn with more stability. Finish the straight part of the leg with a skew chisel and the ankle with a roughing gouge. Finally, turn the pad foot as shown in photo 5. Now is the time to sand the legs. Start with 120 grit sandpaper and finish with 150 grit.

Now cut the 3/8" x 7/8" x 4" mortises in the legs, 5/16" in from the edge and 1/2" down from the top. Be careful when marking the locations of your mortises to make sure the turned feet face out. You'll notice that the mortises meet slightly at their bottoms. Simply plane away a little of the tenon where they meet. Now glue the base together. Start by gluing the short ends together and then attaching them to the long aprons.

SCROLLING THE APRONS • Lay out the scrollwork on the bottom of the aprons using the patterns supplied in the PDF from the "Making Pockets" step. Glue the patterns to 1/4" plywood, cut them out, trace the pattern on your aprons and cut them out on a band saw. Make relief cuts on the inside radii so you can scroll them out easier.

DRILL POCKET HOLES • Make sure that the bottom of the pocket is at least 7/8" from the top edge of the apron to prevent the screws from poking through.

CUTTING CORNERS • First mount a blank between centers with the top towards the drive center. Then use a saw to cut a small kerf on each corner at the line 6" from the top. Don't cut too far or you won't be able to remove the kerf. With a roughing gouge and skew chisel, turn a cylindrical blank from the saw kerf to the foot. At this point use a skew chisel to cut a small rounding up on the square corners of the top (see diagram). Repeat on all the legs and you're ready to do the offset turning.

After the glue is dry, finish sand the entire base, then lay out the holes for the cherry pegs. Any dark hardwood will do for the pegs, but cherry sands smooth and the end grain stains a dark color. Drill a 1/4" hole 1" deep. Follow suit with 3/16" and 1/8" bits, creating a tapered hole. After shaping 16 square pegs (tapered on four sides to a point), tap one in until you feel and hear it seat. The sound of the hammer hitting the peg makes a distinctly different sound when it seats. No glue is required for this as you are running a peg completely through the leg. It won't be coming out anytime soon. Cut the pegs, leaving 1/32" showing and sand until it is a rounded-over bump. Drill 1/4" holes into the pockets from the top of the base for attaching the top.

Make and Attach the Top • The top is the easiest part, but it can make or break the whole project. Wood selection is key. One hundred years ago, you could get extremely wide, highly figured curly maple at a low price. Amazingly most old porringers were one- or two-board tops. That's clear-figured wood 10- to 20-inches wide! Regrettably, those days are gone, and you will have to make do with the painfully high-priced, narrow lumber you get today.

Poplar is easy to get in a decent width and length, but I had to try the Amish sawmills in eastern Pennsylvania to find a retail source for decent curly maple (see the Schedule of Materials for one such mill). I managed to find decent 4/4 that's about 7" wide and a nice piece of 8/4 for the legs (I wasn't sure how thick the legs would be when I started so you could probably get away with 6/4 for leg stock).

The tops for both types of tables are the same size. They just require a different edge pattern. For the porringer top, lay out a 15-1/4" x 25-1/8" rectangle in the center of the top. Make a pattern for the top with 1/4" plywood as you did with the aprons. When you lay the inside corner of the pattern over the outside corner of the drawn rectangle, the outside of the radius should just touch the edge of the top. Trace the pattern on all four corners and jigsaw the top out.

For the "clover" shaped top, things are easier. Trace the double radius on all four corners. When you are done cutting the shape of the top out, chamfer the edges.

Chamfering the edges lightens the overall look of the table, and the chisel work underneath has a very sculptural feel. Before chamfering, use a marking gauge to mark a line that is half the thickness of the top on the entire outside edge of the top. Next, use an adjustable square to mark a line around the underside of the top. For the porringer the measurement is 1-1/2" and for the clover use a 2-1/4" line.

I chamfered the edges with a power planer. It's a tool used mostly by carpenters to remove material from doors when fitting and installing them. And in that role, this tool is unequalled. Finish sand the top to 150 grit.

The last assembly chore is to screw the top to the base. Begin by laying the top upside down on a blanket. Center the base on the top and screw it down with #10 x 1-1/2" wood screws.

In finishing the clover table, I sprayed on a custom-mixed aniline dye followed by three coats of clear finish. This turned the poplar to a mahogany-like color.

The porringer was a different story. To begin with, I hand scraped the top with a Stanley #80 cabinet scraper. With the lack of abrasive sandpaper 250 years ago, this is how the old tables were made ready to finish. Scraping with a properly prepared scraper blade will show up as rows of slight depressions (1/32" deep) with ridges about 2-1/2" apart. I stained the wood with aniline

A WELL-TURNED ANKLE • When you turn the lathe on, the leg's spinning creates a ghost image of what the finished leg will look like. Remove that "ghost" material with a roughing gouge. Stop at the second line that you drew earlier. Lay the gouge on its left side at the second line and slowly rotate the gouge clockwise as you go to the left. Go very slowly until you get the hang of how the wood reacts to the gouge.

TURNING THE PAD • The last thing to do on the legs is turning the pad on the foot. You do this last, as removing the foot material also removes the offset center. Reset the bottom of the leg into the original center and using a parting tool, turn away this "extra" length until it's about 3/8" diameter. This gives you some extra distance from the live center. Then using a small spindle gouge, turn the pad of the foot till it meets the 3/8" diameter. Sand the pad the same as the leg and you're done turning.

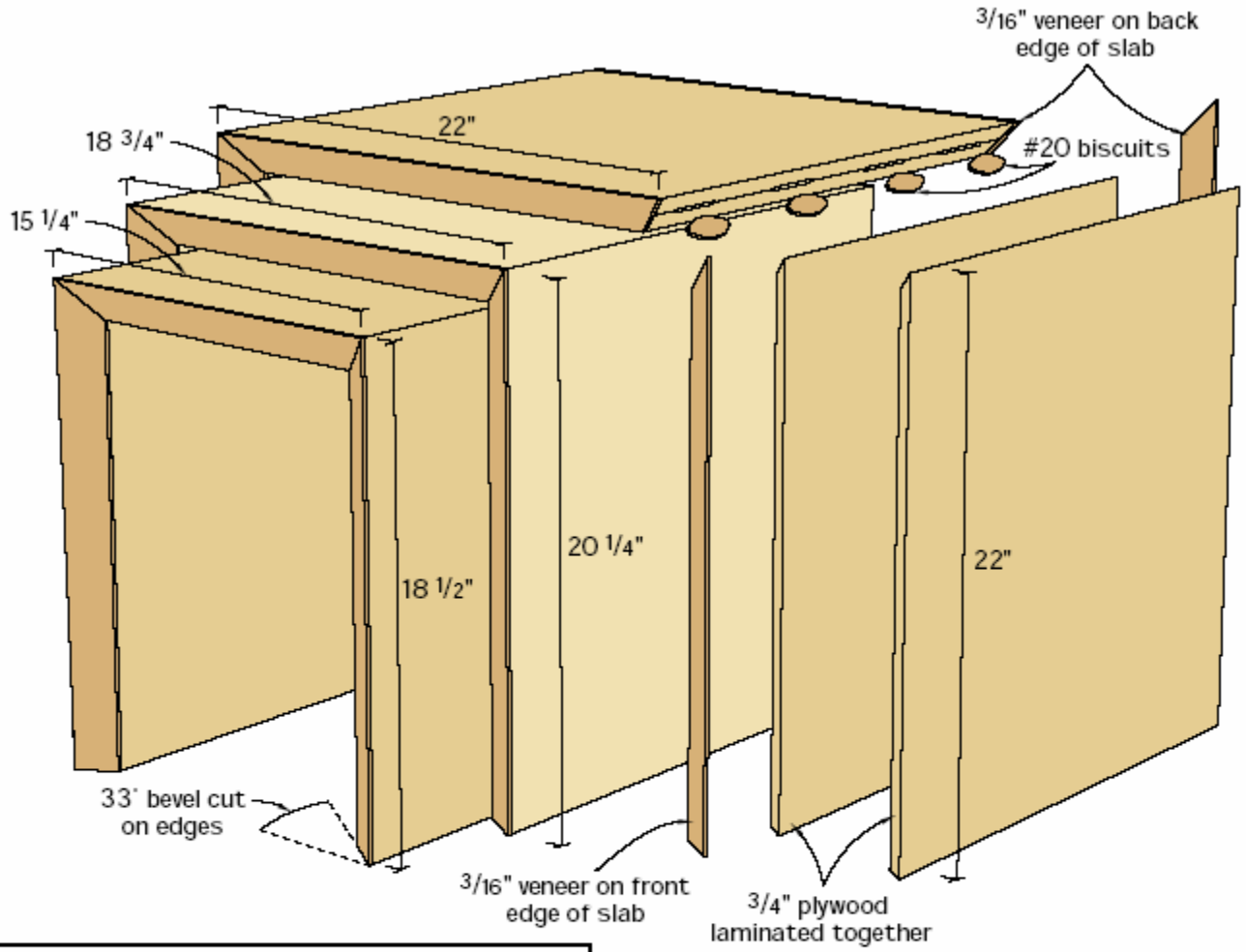
SCULPTING UNDERNEATH • When you've done all you can with a power plane, use chisels and planes to remove material down to the marked line.

How thick is it anyway?

When lumber yards count up the board footage that you buy, it's referred to as a tally. The "tallyman" carries a special notebook and a strange floppy stick called a "tallystick" (go figure!) with odd measurements on it. The lumber you buy is sorted by how many quarters of an inch thick it is. This system starts at 4/4 for 1" thickness on up to 16/4 for 4" lumber

dye and then applied one coat of boiled linseed oil and finished the table with four coats of dark shellac. This imparts a nice honey brown color to the curly maple and is easy to repair. Now where did I put that drink?

NESTING TABLES



Nesting Tables

No.	Item	Dimensions T W L	Material
4	Sides*	3/4" x 22" x 22"	Birch ply
2	Tops*	3/4" x 22" x 22"	Birch ply
4	Sides*	3/4" x 21" x 20 1/4"	Birch ply
2	Tops*	3/4" x 21" x 18 3/4"	Birch ply
4	Sides*	3/4" x 20" x 18 1/2"	Birch ply
2	Tops*	3/4" x 20" x 15 1/4"	Birch ply
6	Veneer edges	3/16" x 2" x 96"	Birch/Maple

*Sizes are of finished components, not cutting sizes.

Make a Slab

Start the tables by ripping three sheets of plywood in half to just under 24" in width. You won't need all that width, but it will come in handy later. As for the lengths, using the full 96" is a little wasteful, but it makes gluing the two halves together easier.

After ripping the sheets, determine which three faces are most attractive and mark these as the outsides of the tables. Next glue the pairs together. To keep the sheets from sliding around during glue-up, pound a nail into each slab

Glue up the Slabs • Spacers underneath the slab allow the solid wood edging to hang over to evenly cover the edges. It doesn't take a lot of pressure to clamp the

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about 1" from the ends. These ends will be cut off anyway, and it makes glue-up much easier. Stack the three pairs together, then clamp across the stack using stout wood braces to spread the pressure.

After the glue is dry, square off one end of each slab. Then cut the slabs to 68", 62-½" and 55" in length. Don't pitch the fall-off pieces, they'll be useful later. Next rip each slab to 23" wide to give you one flat edge. You could run one edge over a jointer, but the adhesive in plywood is murder on high speed steel knives. When you have one square edge, set the table saw's blade to bevel at 33? and rip the three slabs to 21-5/8", 20-5/8" and 19-5/8" wide respectively. Again, save the fall-off.

Homemade Veneer

You're now ready to run some solid lumber to cover the plywood edges. I used soft maple edging on my birch ply tables.

Run out six lengths of 3/16"-thick solid wood for the edges. To plane wood that thin, you probably will have to put an extra board over the bed of your planer — most planers aren't designed for wood that thin.

With the strips ready, it's time to glue them to the slabs. Go find the fall-off from the bevel cuts and grab a couple other sturdy solid strips. Use the fall-off as a caul for clamping. By gluing the edges on the slabs with the bevel facing up, gravity is on your side. I also cheated a little by tacking the edge strips in place with a few small brads at either end. Once again, the extra inch in length will be cut off, so the nail holes won't show.

Glue the edging to the three slabs, then trim the edging flush to the plywood. I used a router with a flush-cutting bit for the back edges, and I used a jack plane to get the beveled edges nearly flush. Then I used a random orbit sander to flush the edges perfectly. To soften the edges I used some 120 grit paper and a block of wood to round over the sharp edges.

Make Your Miters

The tables slip inside one another with a ¼" gap between each, so accurate cutting and spacing is important. To make the mitered corners and still maintain the grain pattern on the table tops, first crosscut the three slabs into three parts. Use the table saw with the blade set to 90?. Start by marking the middle of each slab and cut the top section from the middle of each slab, allowing the excess length to remain on the leg sections.

You're now ready to do the precision cutting, and you'll see quickly why a sharp blade is important. Start with the largest top (22" x 22") and set the blade bevel to exactly 45? and the rip fence to cut the miter exactly to the width of the top. If you have a left-beveling table saw you're in luck as the inside of the table is on the tearout side. If you have a right tilt, that sharp blade is important. Make the first bevel cut on one end, then spin the top and make the cut on the opposite end. Again, with a right tilt you have the extra difficulty of the first miter trying to slide under the rip fence. Adjust your cut for any variance and consider adding an auxiliary fence that fits tight to the table surface. Repeat this with all three tops.

You're now ready to make the miter cuts on the legs. Start with the 22"-high legs and work through the 20¼"- and 18½"-high legs, checking the spacing between the tables by "dry-nesting" as you go.

edges, and too much pressure will force the front edge caul to slide.

Center-cut Slab • The first miter cut on the center slab (on a right-tilt saw) will balance the fall-off piece on the blade. Be aware of possible kickback of the scrap piece.

Disappearing Miter Trick • Unless your rip fence is tight to the saw table, the miter will have a tendency to slide under the fence during the second cut (on right tilt saws). Recheck your measurements to accommodate this, or add a tight-fitting auxilary fence to the standard rip fence.

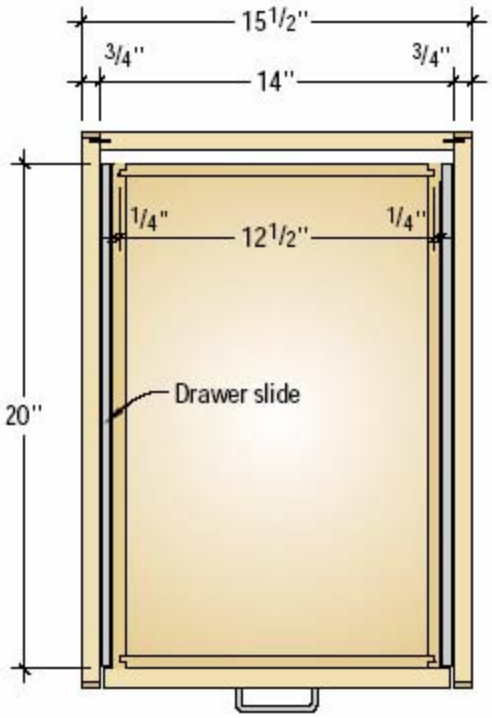
A Little to the Left • Enough clamps and careful adjustment during glue-up will ensure tight miters and an evenly spaced opening from top to bottom.

Assembly

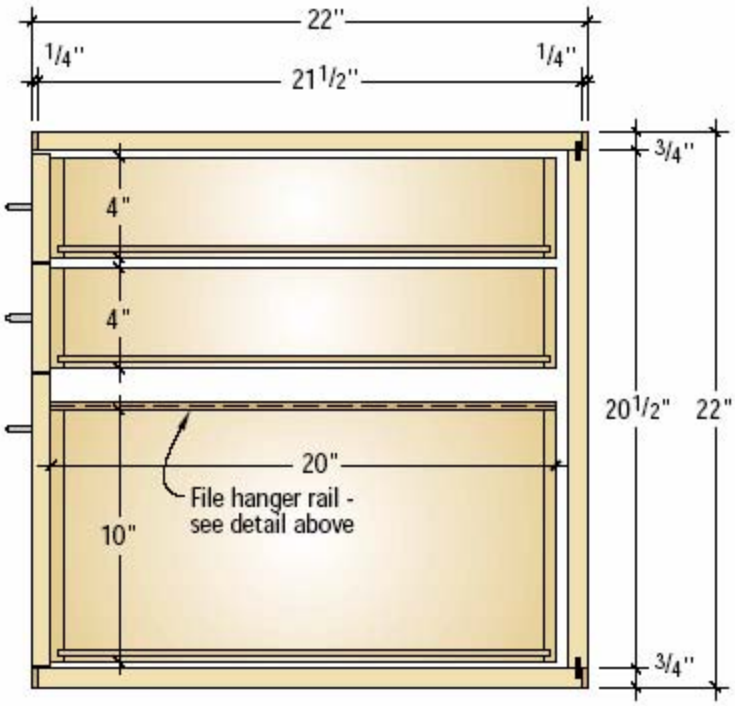
The hard part is done. The rest is biscuits and clamps. I used four #20 biscuits for each miter joint. With the biscuits cut, the fall-off pieces from cutting the slabs to length come into play. You'll stick them between the legs while gluing up the miters. It makes glue-up much easier. First check the internal dimension between the miters on each table top. Try to be as exact as possible, then cut spacers from the fall-off pieces for each table. Finish sand the interior faces of each table and the beveled front edge of each piece before assembly. Put glue on the miters and biscuits and glue the tables. Pay careful attention to the miter joint where the top and legs join. Unlike the hardwood edging, you only have about 1/16" of veneer to sand to match the joint.

With the tables assembled sand the outer faces, paying extra care with the mitered joint. You're now ready to finish. I chose to simply add a few coats of clear finish to the tables, but any number of stains to match an existing decor will work well.

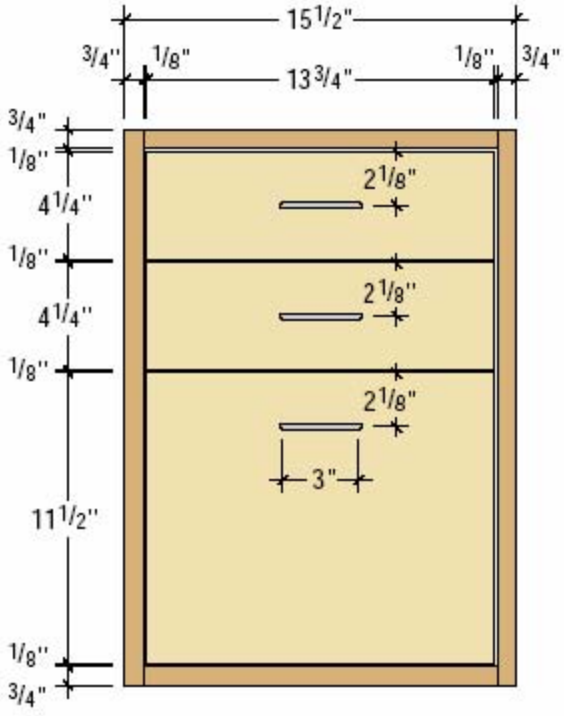
MOBILE FILE CABINET



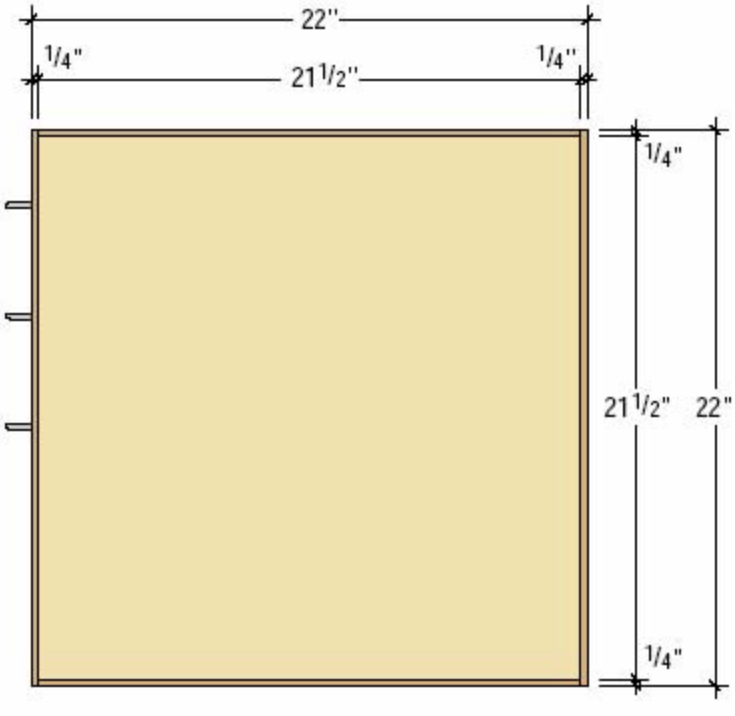
Horizontal section



Profile section



Elevation



Profile

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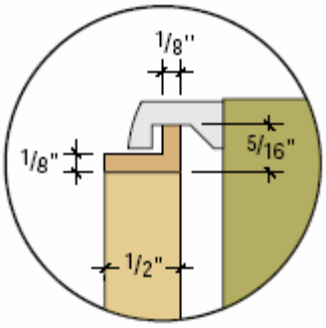

Hanger rail section

Cutting and Edge-banding the Cabinet Parts

First inspect the edges of the plywood, because the joint between the solid-wood edge-banding and the plywood panel needs to be crisp. Although it is tempting, you can't assume that a factory edge is up to snuff, and a quick glance may reveal numerous dings, dents and scratches. I often end up ripping ½" off of each factory edge. To minimize tear-out on cross-cuts, I use a sharp plywood blade and a zero-clearance throat plate. Feeding the panels more slowly, good-side facing up, also helps keep the cuts free of tear-out.

Once your panels are neatly trimmed to size, it's time to mill some edge-banding. I use cherry because I like the color that it darkens to, but substitute as you like: I've also used walnut with pleasing results. I simply plane the cherry to ¾", then rip it into ¼" strips. Precision is critical, as inaccurately sized strips will either overhang the plywood panels and need to be trimmed, or they won't cover the edge entirely and you'll have to make new ones. I usually mill some extra stock in case I notice a defect in one of the strips that wasn't evident beforehand. The cut list calls for 12 strips, which allows for one extra.

I own a few clamps that are designed for attaching solid-wood edge-banding, but they end up gathering dust for several reasons. To edge-band a number of panels requires more clamps than I'm willing to buy, and some clamps seem to lack the clamping pressure that I'd like. I also hate lugging heavy, clamp-laden panels around the shop while I wait for glue to dry. My solution is probably not original, but it is highly practical: I use blue painter's-grade masking tape. It is quick, inexpensive and lightweight. You can even stack a series of panels on top of each other to use space efficiently. And because an ounce of prevention is worth a pound of cure, I use just enough glue to create a tiny amount of squeeze out, which I then wipe up.

Because the edge-banding may overhang a bit, I use a router with a flush-trim bit to carefully remove the offending cherry; a careful touch with a random-orbit sander will remove any glue residue left over. The side panels need to be edge-banded on all four edges, and the top and bottom panels get edge-banded on their front and back edges only. The back receives no edge-banding at all. As a word of caution, veneered plywood is notoriously unforgiving when it comes to sanding. I've learned the hard way that there is no adequate method for repairing sand-throughs in the top layer of veneer, so work carefully to ensure that you'll have to do a minimal amount of sanding.

Assembling the Cabinet

I use biscuits here because they are strong and reliable. In addition, they are invisible once the cabinet goes together, and I didn't want any filled nail holes or plugged screws interfering with the lines of the piece or interrupting the flow of the grain.

I assemble the cabinet in two steps: First I sandwich the back between the top and

During the second stage of cabinet assembly, laying the cabinet on its side keeps you from fighting with gravity. The cabinet comes together relatively easily, and the alignment is a snap thanks to the biscuits.

Go slowly while rounding over the edges, as the cherry can tear out and splinter if a cut is rushed. The roundover is key to the smooth, clean feel of the piece.

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bottom, and once the glue there has set, I sandwich that assembly between the sides. For the first step, I clamp the three parts together and line them up precisely. After marking the locations for biscuits, I pull off the clamps and cut the slots. After dry-fitting, I glue it up and wait a few hours. For the second step, I place one side panel flat on the table, inside facing up. I position the top-back-bottom assembly correctly on top of that, and finally place the remaining side on top of it all. With a couple of clamps holding the parts snugly in place, I mark the biscuit locations, then repeat the process I used on the first half of the cabinet assembly.

With a roundover bit in a router, I ease each edge, which softens the sharp lines of the cabinet. By routing the edge-banding after the cabinet is assembled, the inside corners of the edge-banding flow together smoothly, and the eye is swept through graceful little curves that add a fine detail to the finished piece.

Using spacers to position the drawer slides eliminates one of the leading causes of poor-fitting drawers: inconsistent spacing of slides. Before putting in the spacers, be sure to brush out any sawdust or woodchips that may have accumulated inside the cabinet. A 1/16" discrepancy at this point could cause an annoying misalignment that you'll have to backtrack to correct later on.

Making the Drawers

I build the drawers out of Baltic birch plywood because it is attractive, stable and inexpensive. If you like, you can mill solid-wood panels for the drawer parts – if you do, dress the stock to 7/16", as the Baltic birch plywood sold as ½" actually measures out at 1/16" less. Refer to the cut list for the quantities and dimensions you'll need here. Once you've got the drawer parts cut, rip a groove in the bottom of each – you could use a dado blade here, but for a small number of parts like this, I don't take the time to change blades: I just make two passes side-by-side for the ¼" groove.

For this project, I use a rabbet-dado joint to lock the drawer parts together. It is a strong mechanical joint with plenty of surface area for glue. I sketch it full-sized on paper, then set up my table saw to cut the dado on the inside face of the sides.

I use my miter gauge with a stop attached to make sure the dados are cut at a consistent distance from the ends of the drawer sides. This will take two passes. I then cut the rabbet in the drawer fronts and backs with a similar setup – just change the blade height and move the stop on your miter gauge to correctly position the cut. Test the fit of the joint now while you're still set up to make changes.

A consistent reveal is key to the crisp feel of the piece. The shims shouldn't bow the cabinet sides out at all, but should fit snugly to ensure that the drawer front is centered and that the reveal is even on both sides.

Once the rabbets and dados fit snugly, cut out the drawer bottoms. During glue-up, check that the drawers are square by measuring their diagonals. This ensures that the drawer fronts will line up evenly. If a drawer is slightly out of square, clamp it across the longer diagonal and apply pressure until it conforms. Once the glue dries, it should remain in the correct position.

So that hanging file folders can be easily slid forward and backward in the bottom drawer, you'll need to make two rails that mount on the top edges of the drawer sides. I mill two 20" strips of cherry to ½"x 5/16". I then make two cuts with the table saw to create the "L"-shaped piece needed. The piece can then be screwed into the tops of the drawer sides – be sure to countersink the heads so that they don't stick up and interfere with the movement of files across the rails.

Installing the Drawers

I use 20" Accuride slides because they're smooth and reliable. Each drawer requires one pair of slides, and each slide can be separated into two pieces: The larger one mounts inside the cabinet, and the smaller one attaches to the drawer. I keep the slides together during installation, and I use plywood spacers to lay them out evenly. With the cabinet on its side, I insert the lower spacer (4-5/8" wide), the first drawer slide, the middle spacer (6-¼" wide), the second drawer slide, the upper spacer (2-7/8" wide), and finally the upper drawer slide. Then I simply screw the slides in place with three screws. After flipping the cabinet onto its other side, I repeat the process.

With the cabinet upright on my bench, I push the bottom drawer halfway in and place 1/8" shims underneath it to establish a consistent and correct height for the drawer. I pull out the slides (it should be a snug fit, but not excruciatingly tight) and

line them up with the front edges of the drawer. I screw in the front edges of the slides, and then pull the drawer out all the way. With the shims still under the back edge of the drawer, I screw in the back-ends of the drawer slide. The top two drawers go in the same way, except I use thicker shims on top of the bottom drawer because it receives a taller drawer front to hide the tabs on file folders that protrude above the drawer box.

Trim your false drawer fronts to size on the table saw and iron on veneer tape to all four edges. To attach the drawer fronts, I remove the top two drawers and push the bottom drawer all the way into the cabinet. I then set the drawer front into position, using 1/8" shims on the bottom and sides to ensure a correct reveal all the way around. I use spring clamps to hold the drawer front in place, then I run screws into it from the inside of the drawer. The middle drawer front attaches the same way, but the top one doesn't have room to get a clamp around it. I solve this dilemma by dabbing some quick-set epoxy on the back of the drawer front then pressing it into position. Flipping the cabinet onto its back and shimming around the edges of the drawer front assures that it will remain aligned. Once the epoxy has cured, the drawer front can be secured with screws like the others.

To attach the drawer pulls, I make a template from a scrap of ¼"-thick plywood and cut it to the same size as the upper drawer fronts. I draw lines across the vertical and horizontal centers of the template, and center my pull relative to these crosshairs. Once the holes are drilled on your template, you can place it directly on the drawer fronts and drill through your pre-positioned holes. Using a template like this might seem like extra work but, it saves time and guarantees consistent placement on each drawer front.

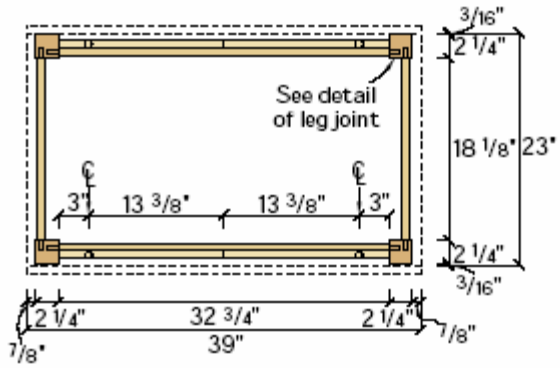
Finishing it Up

For an office environment, I favor the durability of oil-based polyurethanes, although if I were building this for my home, I might be tempted by the hand-rubbed feel of the newer gel varnishes. When your finishing process is completed, simply screw on four 2"-diameter wheels (locking casters will keep it from rolling around while you open and shut drawers), and bolt on the drawer pulls.

And now, the moment you've been waiting for: Go ahead and fill those drawers with all the stuff that usually clutters up your desk.

While I can't promise that you'll be more efficient or productive as you tend to whatever paperwork keeps you away from the workshop, I'm confident that you'll enjoy the smooth, crisp look of your new rolling file cabinet. And the clean desktop isn't half bad, either.

DROP-LEAF TABLE



Schedule of Materials: Drop-Leaf Table

No.	Item	Dimensions T W L	Material	Notes
1	Table top	3/4" x 23" x 39"	Mahogany	
2	Leaves	3/4" x 15 3/4" x 39"	Mahogany	
4	Legs	2 1/4" x 2 1/4" x 28"	Mahogany	
2	Short aprons	3/4" x 4 1/4" x 20 1/8"	Mahogany	1" TBE; 1/4" offset
2	Long aprons	3/4" x 4 1/4" x 34 3/4"	Mahogany	1" TBE; 1 1/4" offset
4	Leaf supports	3/4" x 3 1/4" x 18"*	Mahogany	
2	Triangles	3/4" x 3 1/4" x 6 1/2"	Mahogany	

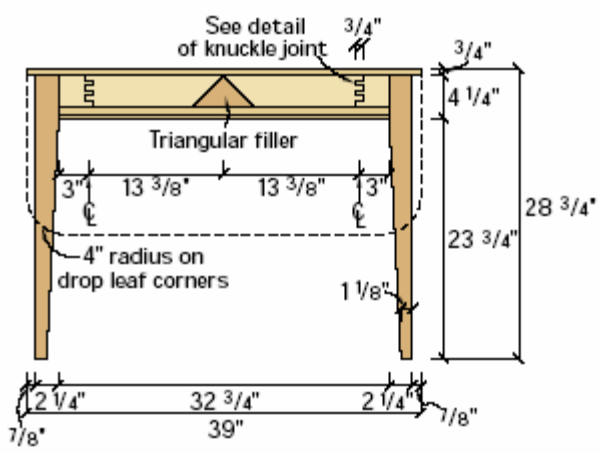
TBE– Tenon, both ends; * cut to fit

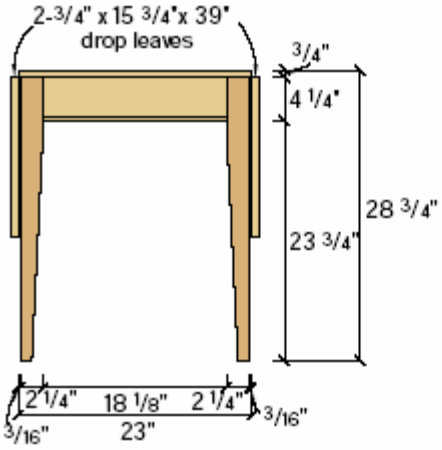
Supplies

4 Hinges for drop-leaves; Rockler part number 29249; $4.29 for 2 hinges

6 Tabletop fasteners; Rockler part number 34215; $1.99 for 8 fasteners

Rockler can be reached at www.rockler.com or 800-279-4441





Start with the Basics

After cutting all your rough stock to length, surface your wood down to ¾" thick (except for the legs). The original 19th-century table's top was only one board. You can still find mahogany in these widths, but I couldn't. To obtain the appropriate width, I had to glue up two boards for both the leaves and the tabletop. I used three biscuits at each joint to keep the boards aligned during glue-up. Also, if you can't get 2¼"-thick stock for the legs, ask for turning blanks at the lumber store instead; you might just get lucky.

Mortises, Tenons and Tapers

The first step is to make mortise-and-tenon joints where the aprons join the legs. I made the tenons using a dado stack on the table saw. Cut the shoulders as shown in the photo on the next page. Make the tenons 3/8" thick, 1" long and 3¼" wide. After cutting your tenons, cut a groove in the aprons for the tabletop

fasteners, which will attach the top to the table's base. Make this slot by cutting a kerf in the aprons that's 7/16" down from the top edge. For a nice detail, I routed a bead on the bottom edge of the aprons.

The mortises on all the legs are made 1-7/16" from the inside for the short aprons and 7/16" from the inside for the long aprons as shown in the diagram below. Cut your mortises on the legs; I used a mortiser, but you can use a chisel or Forstner bit.

The original table had turned legs, but in order to simplify things, I tapered the legs. Tapering jigs for the table saw can be tricky, so I used a band saw to cut the tapers about 1/16" shy of my line and then cleaned up the cut on the jointer. The taper should start 1" below where the aprons end and result in a leg that tapers to one-half the original thickness. Remember: taper only the sides that have mortises.

To cut the tenons, use a dado stack on the table saw. Reduce the tenon in thickness by 3/16" on each side.

Install the Hinges

After tapering, sand the legs and aprons. Start with 100-grit sandpaper, move up to 150-grit, then finish with 220-grit. Next, glue up the legs and aprons and clamp. After gluing up the base, turn your attention to the top.

Install the hinges that connect the tabletop to the leaves. Use two on each side, and place them 7¼" inches from the end to allow room for the leaf supports. Lay out the location of the hinges by first placing a 1/16" spacer (I used pieces of plastic laminate) between the leaf and tabletop. Clamp the pieces together, put the hinges down and trace them with a pencil. Use a router with a straight bit to hog out most of the area. Then use a chisel to define the corners. Install the hinges and make sure they work properly.

Cut ½" shoulders on each side of the aprons.

A 4" radius on the outside corners of the leaves on the original table was a nice touch. In order to recreate this, I traced the curve from the original and made a template using a piece of plywood. Cut the shape to size on a band saw and then use the template with a router and straight bit to finish the radius.

Make the Leaf Supports

To keep the leaves upright, assemble two supports for each side. These are basically two pieces of wood finger-jointed together to form a "knuckle" joint hinge. The ½" knuckle joints are made on a table saw using a finger-jointing jig. Round the edges of the "fingers" with a rasp or sandpaper so the joint pivots. Then drill a ¼" hole through the fingers and tap a ¼" dowel in place. Instant wooden hinges. One note: you'll have to cut a notch in the two supports so they'll clear the hinge barrels on the top. Mark the location of the notch when you dry-assemble the table. The angle cuts on the supports form a triangular hole against the apron. Cut a triangular piece of mahogany to fill this space, being careful not to let the filler rub against the supports. For simplicity, you may use brass hinges instead of knuckle joints.

You will need to fasten the tabletop using tabletop fasteners, which requires making a kerf in the aprons. I made this kerf on the table saw 7/16" from the edge and ¼" deep.

Sanding and Finishing

Remove the hinges from the tabletop and sand the table. Because the top will be the most visible surface, I chose to go up to 220 grit. The bottom requires only 150 grit. In order to simplify finishing, I waited to attach the supports until after finishing. This requires masking off the area where the support will be glued. For the finish, I applied a dark mahogany stain made by United Gilsonite Laboratories (P.O. Box 70, Scranton, Penn. 18501; 800-272-3235; www.ugl.com). The color is called "118 Dark Mahogany," order number 11811, LR1294. Both the phone number and the website can refer you to a retailer in

your area. After letting the stain cure, I applied four coats of clear lacquer.

Final Construction Details

After the lacquer has dried, attach the supports and the triangle with glue and nails through the inside of the aprons. Place the top on the base and make sure the supports keep the leaves level. Now attach the top. Because of the expansion and contraction of wood, you will need to attach the aprons to the tabletop using tabletop fasteners. These fasteners are available from Rockler and are listed in the Schedule of Materials. The tabletop fasteners are installed by simply screwing the fasteners into place. Because the wood will move more in width than in length over time, be sure to leave more space on the long apron sides for the fasteners.

Overall, I was extremely pleased with the results of my project. I think my great-great-grandfather would be proud to know that I've continued the family tradition.

I made the mortises using a mortiser. In order to form the holes more safely, you should think of the path of least resistance. Instead of just going in a straight line from left to right or right to left, make two holes with a slight gap between. Then clear out the gap. If you simply work in a straight line, the mortiser's chisel could bend or break.

I tapered the legs on a band saw, then ran the legs over the jointer in order to make them smooth.

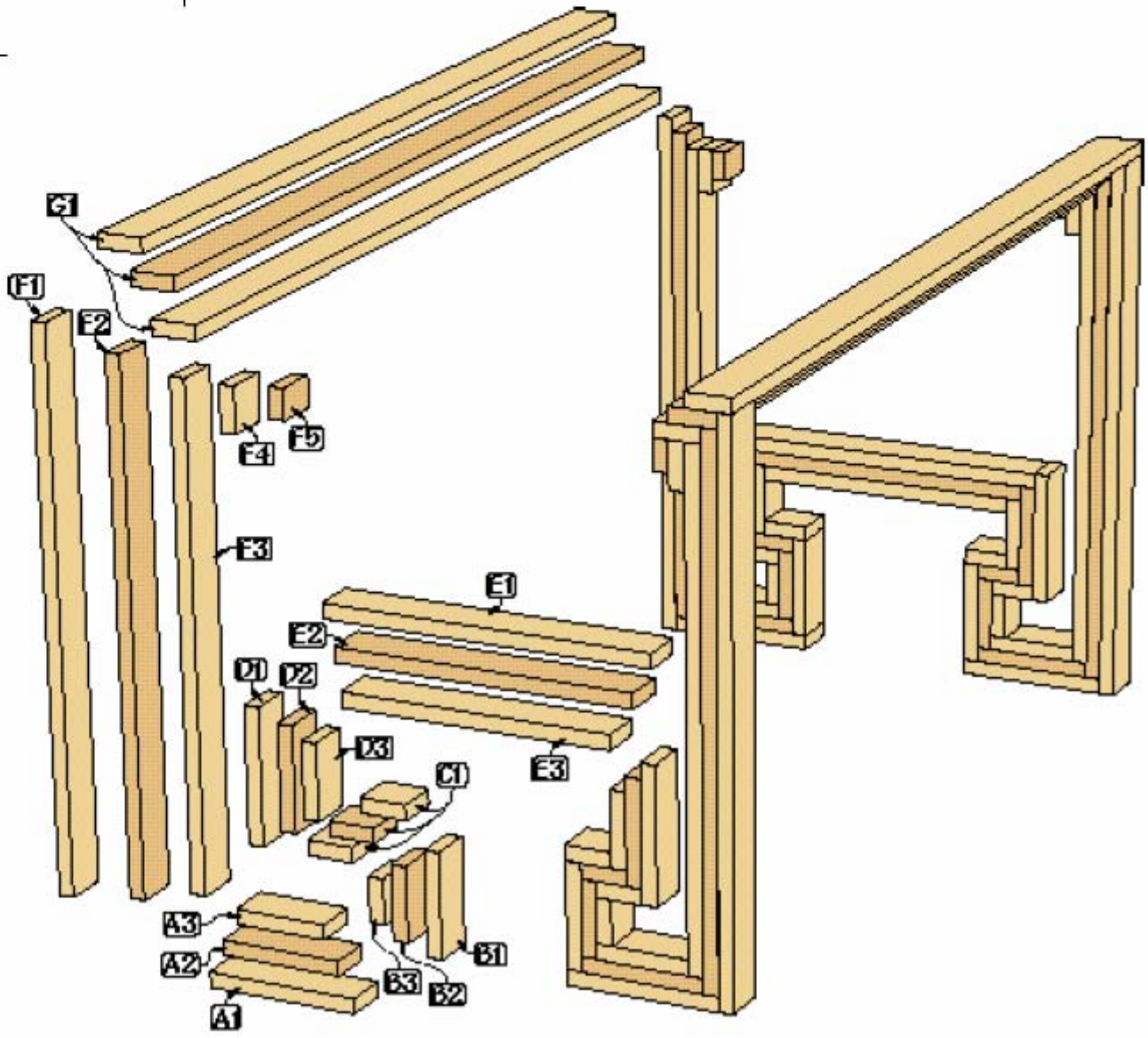
GREEK KEY DESK

Schedule of Materials:

Greek Key Desk

No.	Item	Dimensions T W L
4	A1	3/4" x 2 1/4" x 7 1/2"
4	A2 (*all)	3/4" x 2 1/4" x 6"
4	A3	3/4" x 2 1/4" x 4 1/2"
4	B1	3/4" x 2 1/4" x 5 1/4"
4	B2 (*all)	3/4" x 2 1/4" x 3 3/4"
4	B3	3/4" x 2 1/4" x 2 1/4'
12	C1 (*4)	3/4" x 2 1/4" x 2 1/4"
4	D1	3/4" x 2 1/4" x 6 3/4"
4	D2 (*all)	3/4" x 2 1/4" x 5 1/4"
4	D3	3/4" x 2 1/4" x 3 3/4"
2	E1	3/4" x 2 1/4" x 16 1/2'
2	E2 (*all)	3/4" x 2 1/4" x 15"
2	E3	3/4" x 2 1/4" x 13 1/2'
4	F1	3/4" x 2 1/4" x 27 3/4'
4	F2 (*all)	3/4" x 2 1/4" x 26 1/4'
4	F3	3/4" x 2 1/4" x 24 3/4'
4	F4	3/4" x 2 1/4" x 2 1/4"
4	F5 (*all)	3/4" x 2 1/4" x 1 1/2"
6	G1 (*2)	3/4" x 2 1/4" x 48"

*Indicate darker wood pieces



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The desk is constructed by laminating strips of wood together. By making some of the layers shorter than others, you make the joints for attaching that lamination to another. As a result, all of the materials for this project must be machined precisely. Any variances will show up as gaps in the joints after final assembly.

Tricks to Dead-on Components

There are two tricks to make sure your pieces are all the right size and won't slide around when you glue them up. First, when cutting out the pieces for this desk, I found it easier to cut them grouped by letters, such as A1, A2, A3. A1 is the longest piece, A2 is 1½" shorter, and A3 is 3" shorter than A1. Because all of the desk's components are stepped like this, I came up with a quick way to make these cuts. Cut the longest piece first using a stopblock on the fence of your table saw's sled or miter gauge. Then take two scrap pieces of ¾"-thick wood from the project and glue them together to form a 1½"-thick spacer. Hold this piece against the stop block to cut the second piece. Then make a second spacer using two more scraps and use both spacers to cut the third piece. This method makes the desk components perfectly sized. Cut out all your pieces, then get ready to glue them up.

To keep your pieces from sliding around during gluing, make a jig from two pieces of melamine-faced particleboard put together lengthwise at a right angle to create a straight fence. Then put a small piece of wood on the end of the jig to act as a stop. This gives you a square corner to work out of.

Here I'm cutting the A2 piece with one of the spacers in place. To cut the A3 piece, use two of the spacer blocks.

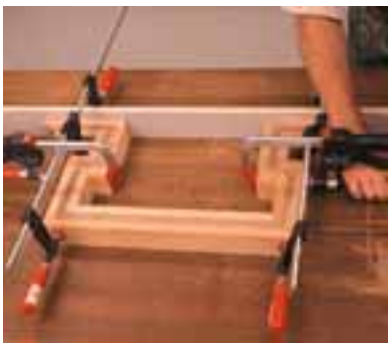
Here I'm clamping the E and D pieces together. Use spacers on the ends of the D parts to hold them in place against your gluing jig.

On to Assembly

Start by gluing the E pieces and two sets of the D pieces together to form a shallow "U." (When gluing these step-mitered joints, I found it best to use polyurethane glue. It provides a strong bond for this type of joint.) I dry-fit all the parts to be sure I would be able to get all the pieces to come together tightly. After applying the glue, clamp the length of the E pieces first. By using ¾" spacers at the ends of the D parts, applying even clamping pressure is easy on the lengths of the D parts. Make two of these assemblies.

The next assembly consists of the C, B and A parts. The glue-up of this assembly is done the same way as the E and D assembly. Make four of these assemblies.

Next glue one of the E and D assemblies and two of the ABC assemblies together to form the Greek key part of the end assembly. I had to clean the glue squeeze-out at the joints and pare the wood down in a couple places with a chisel to get a tight fit. If your pieces don't come together tightly, your joints will not be strong.



This is where your parts start to look like something. Joining the three assemblies creates the Greek key at the bottom of the base.

For the next assembly, put two glue-up jigs at a right angle. This makes the glue-up of the two legs (F) to the Greek key assembly easy to keep square.

Glue the F4 and F5 pieces to the tops of each leg. Use a stop block to keep the pieces even with the end of the F3 piece of each leg.

The G pieces attach the two end assemblies together. It is easier to control gluing and alignment of the G1 pieces if they are glued into place one at a time, starting at the bottom and working up.

When assembling the legs to the Greek key, I used a spacer (seen at the bottom of the photo above) to keep the legs spaced properly while gluing-up.

Sanding and Finishing

I used a random orbital sander, going up to 150 grit sandpaper. Break all the sharp edges with a sanding block using 150 grit sandpaper. For a top coat, I applied three coats of a clear finish.

For the top I used a ½"-thick piece of 30" x 50" tempered glass polished on all edges. (To keep the glass in place, use six clear door bumpers applied to the top

stretchers.) It wasn't until I completed this desk and had the glass top in place that I appreciated how striking it looked.

The stop block clamped at the end of the glue-up jig keeps the F4 and F5 pieces level with the top of the G3 piece.

Start by gluing G1 in place, then work your way up. As you can see in the photo, I clamped the entire leg to my assembly bench to make things easier.

PICNIC TABLE

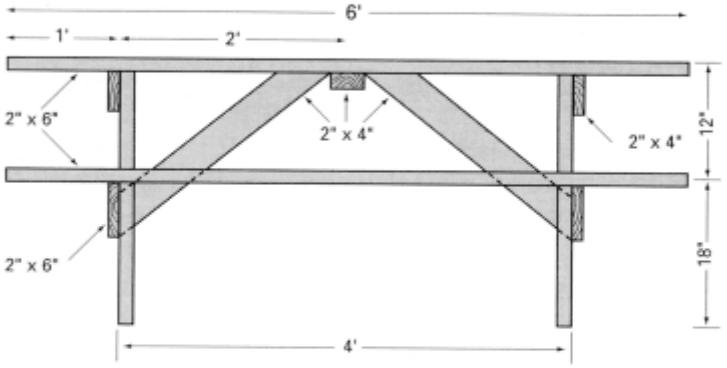
Picnic Table

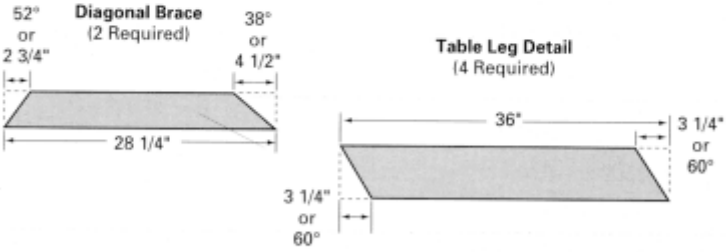
Lumber

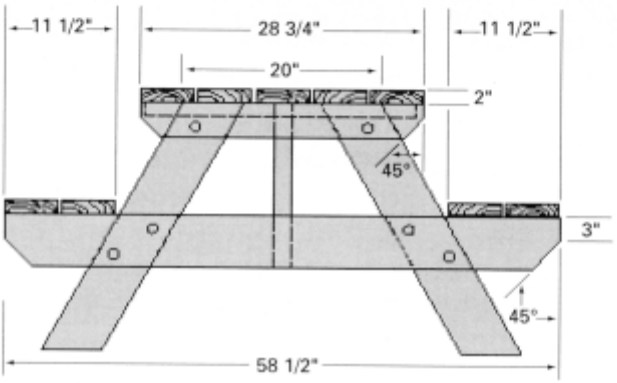
- Seat, Top, Legs: (6) 2"x 6" - 12'
- Seat Supports: (1) 2"x 6" - 10'
- Table Supports, Braces: (2) 2"x 4" - 10'

Hardware

- (12) Galvanized Carriage Bolts: 3/8"x 3 1/2"
- (12) 3/8" Flat Washers
- 2 1/2" Galvanized Nails as required







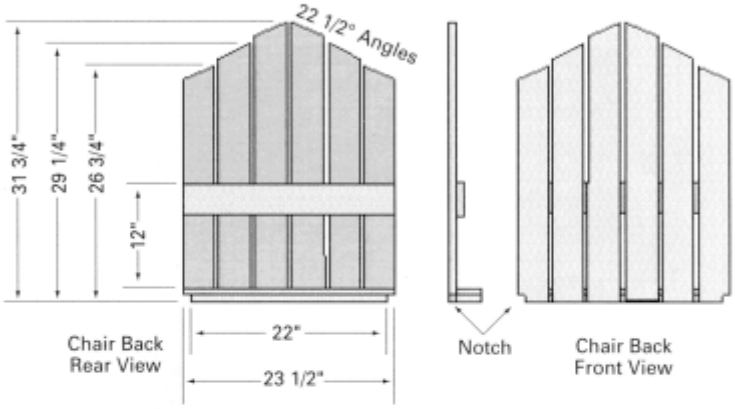
CHATTAHOOCHEE CHAIR

Chattahoochee Chair

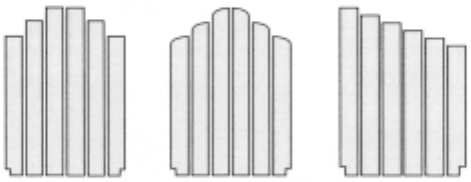
Lumber

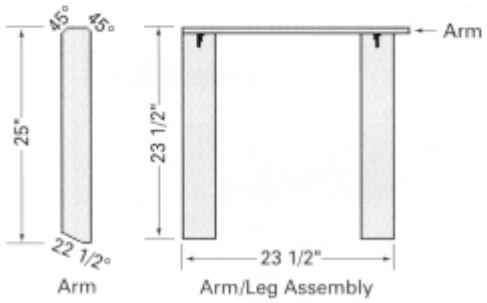
- (7) 1"x 4" - 8' [4' waste]
  or
- (5) 1"x 4" - 8' and
- (1) 1"x 4" - 12' [4' waste]

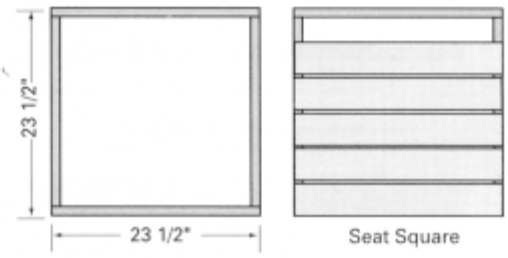
Hardware as required



Chair Back Variations







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PLANTER BENCH

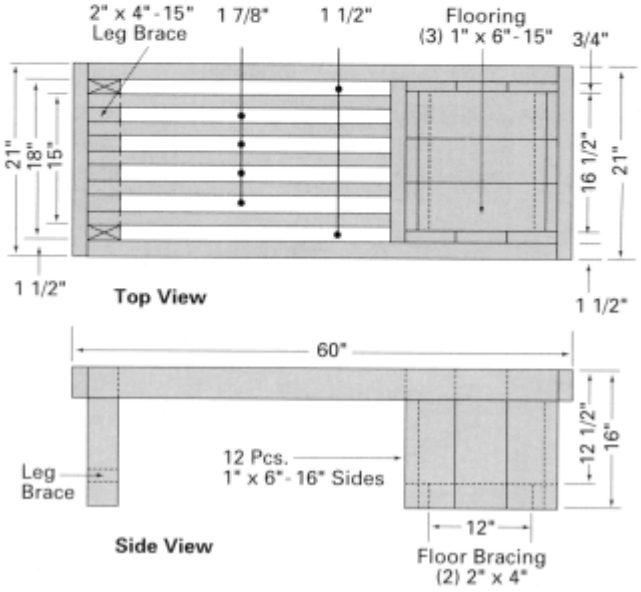
Planter Bench

Lumber

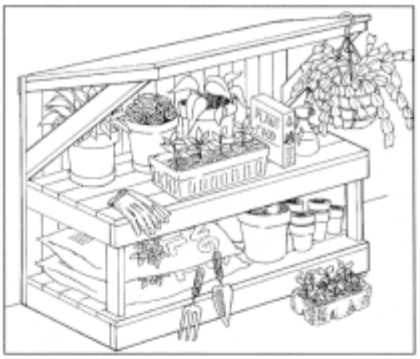
- (6) 2" x 4" - 8'
- (3) 1" x 6" - 8'

Hardware

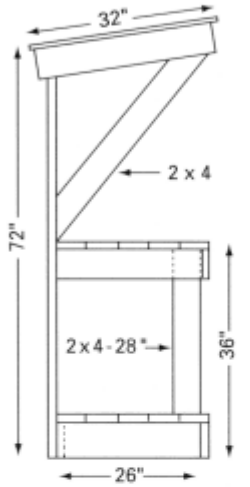
- 6d Galvanized Nails as required
- 16d Galvanized Nails as required



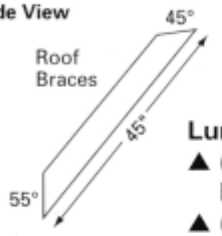
GARDEN WORK BENCH



Garden Work Bench



Side View

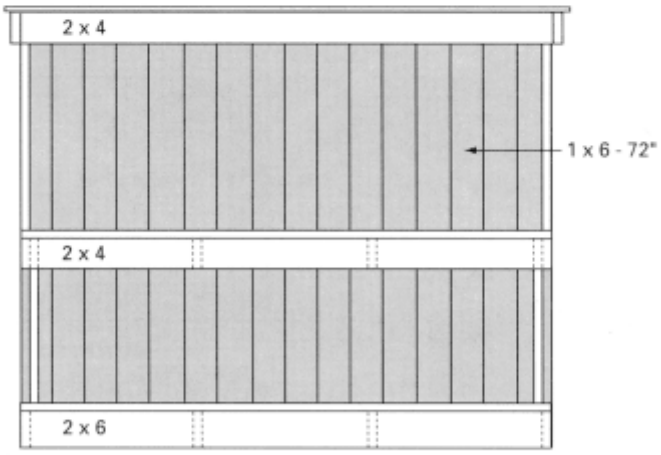


Lumber

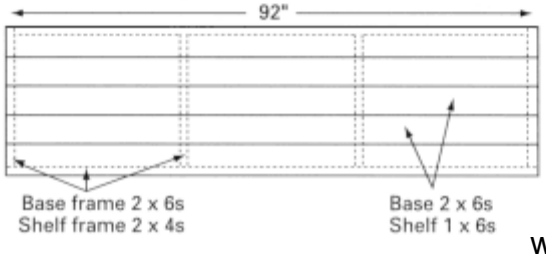
- (1) 4'x 8'- 1/2" Plywood
- (3) 2"x 4"- 8'
- (3) 2"x 4"- 12'
- (5) 2"x 6"- 8'
- (2) 2"x 6"- 12'
- (5) 1"x 6"- 8'
- (8) 1"x 6"- 12'

Choice of Roof Covering
Hardware as required

Front View



Top View (shelf and base)



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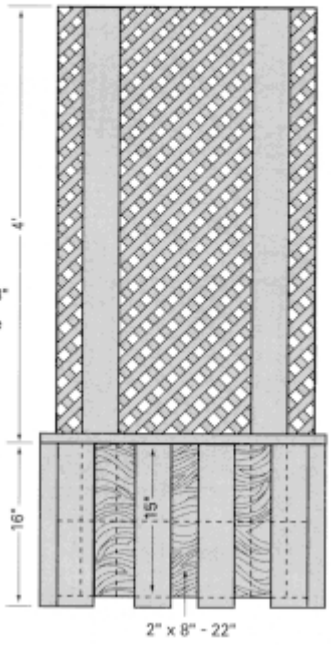
PLANTER BOX

Planter Box



(2) 2" x 4" - 63"
2' x 4' Lattice

Box Front View

Lumber

- ▲ Base, Top Trim, Sides: (3) 2"x 4" - 12'
- ▲ Sides: (2) 2"x 4" - 8'
- ▲ Sides: (2) 2"x 8" - 8'

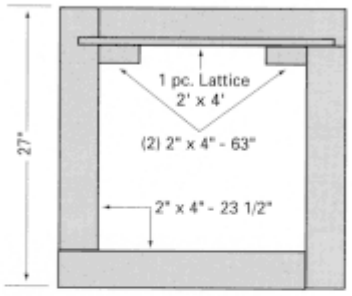
Hardware / Nails

- ▲ Base to Floor: 3" galvanized as required
- ▲ Sides 2"x 4" to 2"x 8": 2 1/2" galvanized as required
- ▲ Sides 2"x 8" to 2"x 8": 3" galvanized as required

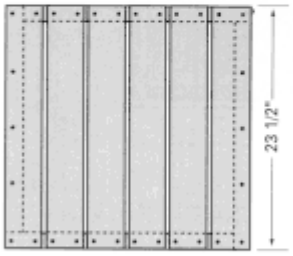
Optional Lattice Work

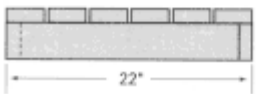
- ▲ (1) 2'x 4' Lattice
- ▲ (2) 2"x 4" - 63" [(1) 2"x 4" - 12']

Top Trim

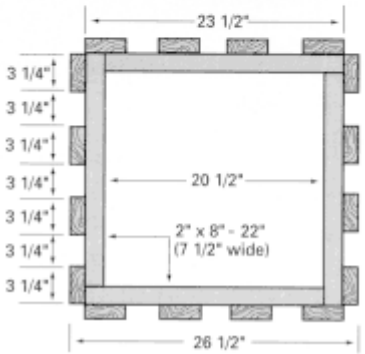


Base Top View





Base End View



Box Top View

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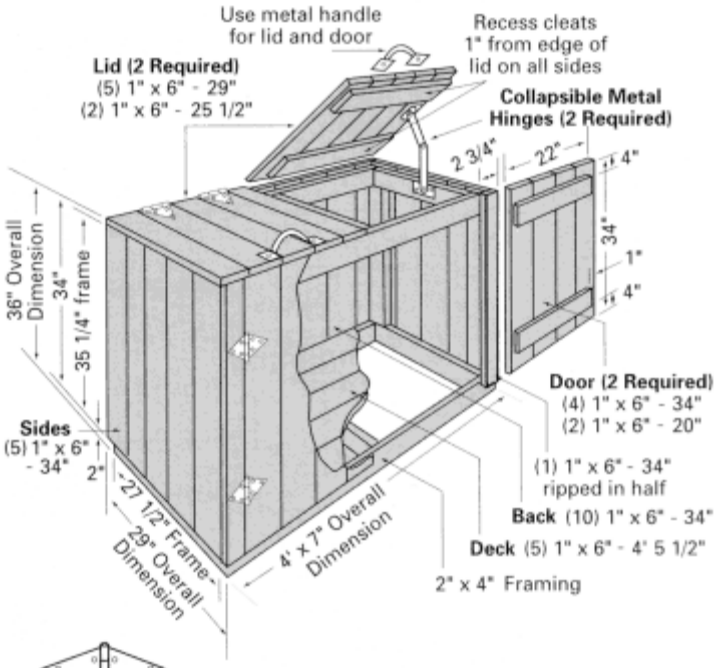
STORAGE AND TRASH CAN BIN

Storage and Trash Can Bin

Lumber

- ▲ Frame: (2) 2"x 4" - 14'
- ▲ Front, Back, Sides, Deck, Lids and Doors:
  (20) 1"x 6" - 6'
  (2) 1"x 6" - 8'
  (3) 1"x 6" - 10'



Attach lids and doors with strap hinges mounted on exterior

Hardware

- ▲ Frame to Frame:
  2" Nails as required
- ▲ All other 1"material:
  1 1/2" Nails as required
- ▲ Lids: 2 pr. 5" Strap Hinges
  (2) 5" Handles
- ▲ Doors: 2 pr. 2" Strap Hinges
  (2) 5" Handles
- ▲ (1) Small Gate Latch

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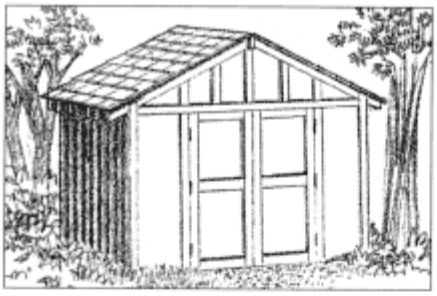
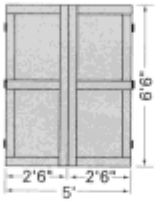
STORAGE SHED



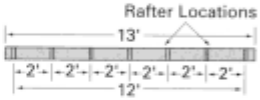
Storage Shed

Doors
Cut Double Doors from 2 sheets of 1/2" *Wolmanized* plywood and attach 1" x 4" *Wolmanized* trim as shown



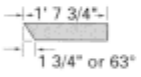
Rafters
Cut 14 rafters 6' 6 9/16" long from 2" x 4"s and nail to ridge beam blocks and ceiling joists

Ridge Beam Detail

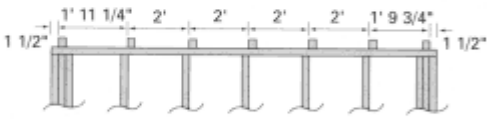


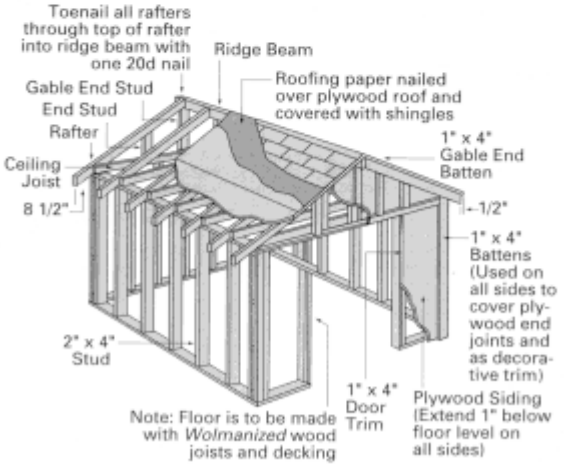
Gable End Stud Detail
(2 Required)

End Stud Detail
(4 Required)



Ceiling Joists
Toenail seven 2" x 4" x 10' joists along side wall top plates with 10d nails





SHED

Lumber

Framing:
- (44) 2" x 4" - 8'
- (11) 2" x 4" - 10'
- (5) 2" x 4" - 12'

Ridge Beam:
- (1) 2" x 6" - 14'

Door Trim:
- (1) 1" x 4" - 8'
- (4) 1" x 4" - 10'

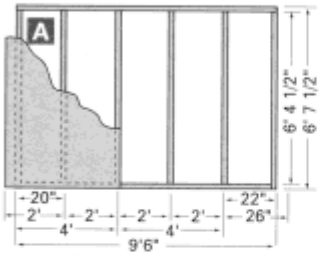
Doorway and Gable End Batten:
- (8) 1" x 4" - 8'
- (2) 1" x 4" - 6'

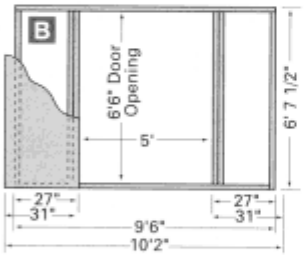
Batten Trim:
- (2) 1" x 4" - 10'
- (2) 1" x 4" - 12'
- (36) 1" x 4" - 8'

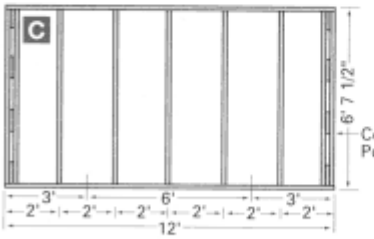
Wall, Roof, Door and Gable End Covering:
20 sheets 4' x 8' x 1/2" Exterior Plywood

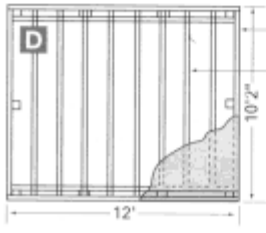
Hardware and Other Materials

- 3d, 6d, 10d and 20d Nails as required
- Steel 'T' Door Hinges: 3 pr.
- Safety Hasp: 1 pc.
- Shingles: Sufficient amount for 170 sq. ft. Roof Area plus 13 ft. of Ridge and 26 ft. of Eaves
- Asphalt Roofing Paper: 2 rolls
- 7/16" Roofing Nails as required







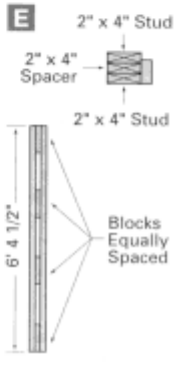


FLOOR

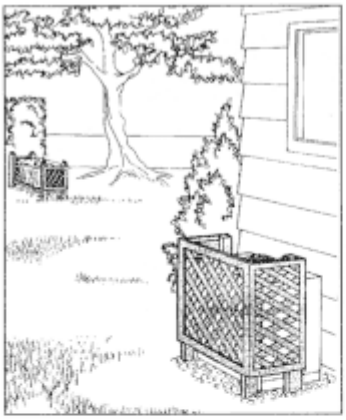
Lumber

- (12) 4" x 4" - 4' Main Support Posts (length may vary according to terrain)
- (4) 2" x 8" - 12' Header Boards
- (2) 2" x 8" - 12' Fascia Ribbon Boards
- (2) 2" x 8" - 10' Fascia Ribbon Boards
- (8) 2" x 8" - 10' Joists
- (22) 5/4" x 6" - 12' Floor Decking

A. Rear Wall Framing
B. Front Wall Framing
C. Side Wall Framing
D. Floor Decking
E. Corner Post Assembly and Top View



UTILITY SCREEN

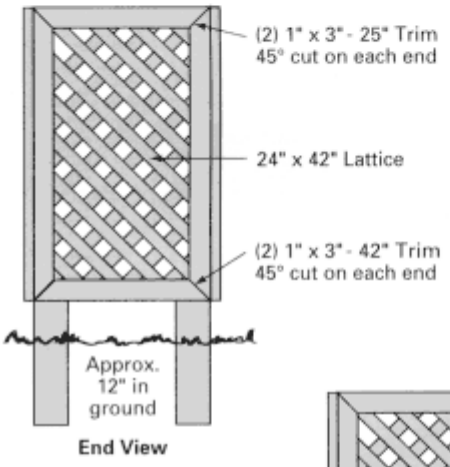


Utility Screen

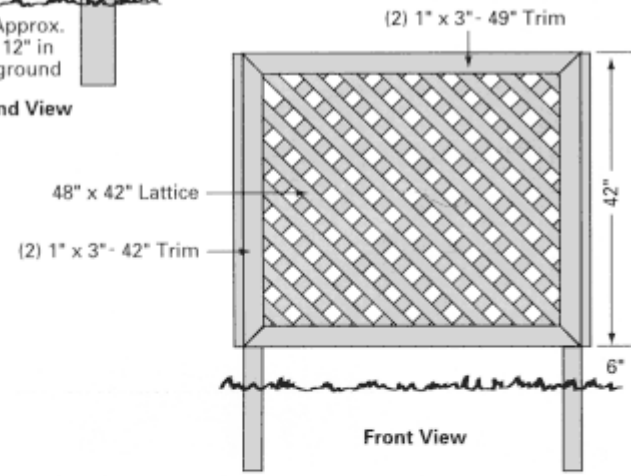
Lumber

- ▲ (4) 2" x 4" - 5' Posts
  [2 pcs. 2" x 4" - 10']
- ▲ (1) 4' x 4' Lattice*
- ▲ (2) 2' x 4' Lattice*
- ▲ (1) 1" x 3" - 49" **
- ▲ (6) 1" x 3" - 42" **
- ▲ (4) 1" x 3" - 25" **

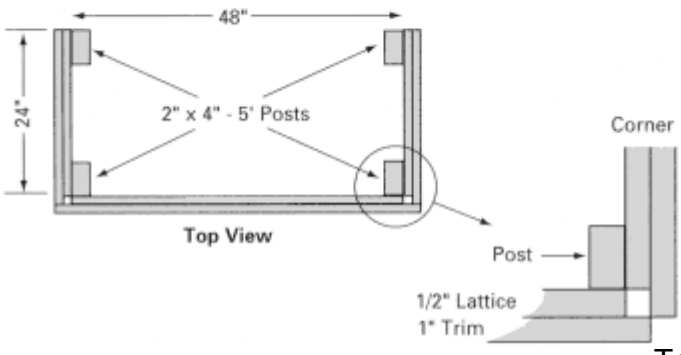
[* 1 pc. 4' x 8' Lattice]
[** 3 pcs. 1" x 6" - 8']
Hardware as required



End View



Front View



Top View

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BATHROOM TOWEL RACK

Wood Selection

The two basic categories of wood used most often in wood working projects are hardwood and softwood. Hardwood is more durable and less prone to dents and scratches. It is also more expensive but will finish to a better advantage. Soft woods, like pine, are more prone to dents and scratches and do not have the durability of hardwood. Softwoods are much less expensive and easier to find.

Ask your lumber supplier to show you "Class 1 " or "Select Grade" lumber. Make sure it is properly dried, straight, and free of knots and defects. (It may be impossible to be completely free of defects but be sure you understand how to cut around these.)

Ask your Lumber supplier for assistance when purchasing your wood. Similar to laying a pattern out on a piece of cloth, often you can cut several different pieces of the same thickness of wood out of a single piece. It is a good idea to add up the total number of board feet, being careful to make sure you group short pieces in a board with long pieces to minimize waste.

This project could be built out of scrap wood already in your workshop. If you choose to use new stock from the lumber yard, both hardwoods and softwood are good choices.

Note: Developing a good relationship with Your lumber suppliers is important. They can help guide you in making material selections as well as making special orders for a type of wood you may desire for a project.

Now that you have reviewed safety hints, learned the mistakes to avoid, reviewed the basic components and gathered your tools and materials for your projects - you are ready to BEGIN!

Steps to follow:

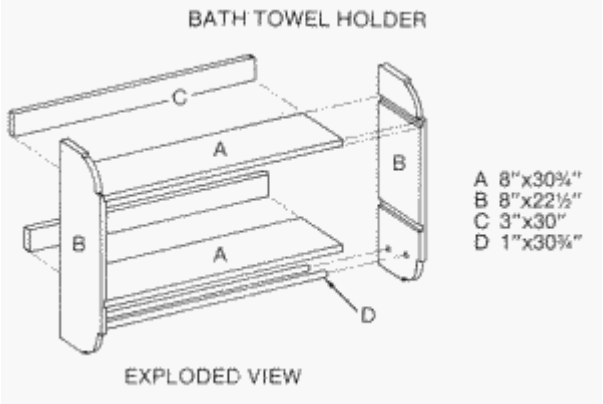
1. Cut the wood to size
2. Cut the dadoes for the shelves
3. Band saw the design
4. Drill holes for the rack or racks. (Depending on the size of your sides you can have one or two towel bars)
5. Assemble the bathroom rack

Cut the Wood to Size

For this project there are two sides, two shelves, and the backs for the shelves. Wood from a lumber yard may not be square so square the ends before cutting the stock.

1. Crosscut the stock to length using a table saw with a stop block. Guide the wood through with the miter gauge. Note: Do not use a miter gauge with the rip fence as it may cause the wood to bind.

2. Rip the stock. Measure from the rip fence to the inside of the blade so that the cut is made on the scrap side of the wood and is the proper dimension.



Cut the Dadoes for the Shelves

Check your plans for the exact location of the dado cuts.

1. Use a table saw with a dado set to make the cuts. A miter gauge with an extension fence and stop block will assure an accurate cut. A router with a guide board clamped at the correct distance can also be used to make the dado cuts. Note: Always start the router away from the wood and ease it up after the bit is on speed to make a clean cut.

Cutting the Curve

1. Measure and mark the wood for the design that you wish to make. The one shown is two straight lines using a coffee can top to join the ends of the marks.

2. Using a band saw or a jig saw, cut the two straight marks first, then on the waste side of the curve, cut in and make short curved cut first, then going slowly cut the long side of the curve.

3. Repeat this process on the other ends.

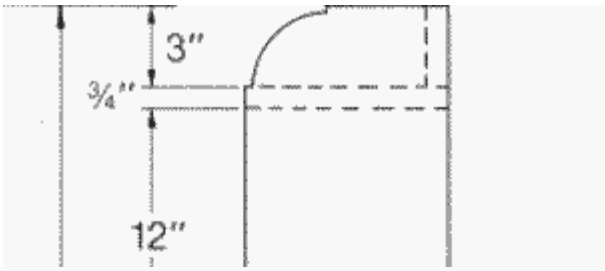
Drill the Holes for the Towel Rods

Use a drill or a drill press to make the holes.

1. Measure according to the plans for the hole locations and mark them.

2. Set the depth for the hole to be drilled. A depth gauge can be made with a piece of tape wrapped around the bit if you are not using a stationary tool.

3. Drill the holes for the towel bar.



Assemble the Bathroom Rack

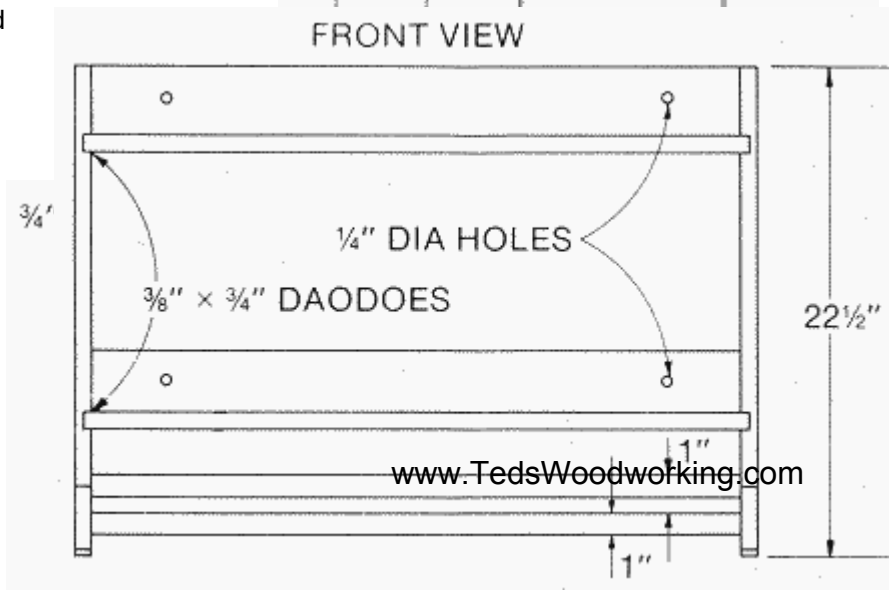
1. Sand the pieces before assembling.

2. Assemble the unit dry to check for proper fit.

3. Apply wood glue to all edges and rod ends. Then use clamps to hold tight while drying.

4. Apply finishing nails while drying for additional strength.

5. Sand the rack and apply the finish you have selected according to the manufacturers instruction. There are helpful hints on finishing at the end of this pamphlet.



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BANDSAW BOX

Materials

Wood Selection

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Ask your lumber supplier to show you "Class 1 " or "Select Grade" lumber. Make sure it is properly dried, straight, and free of knots and defects. (It may be impossible to be completely free of defects but be sure you understand how to cut around these.)

Ask your Lumber supplier for assistance when purchasing your wood. Similar to laying a pattern out on a piece of cloth, often you can cut several different pieces of the same thickness of wood out of a single piece. It is a good idea to add up the total number of board feet, being careful to make sure you group short pieces in a board with long pieces to minimize waste.

This project could be built out of scrap wood already in your workshop. If you choose to use new stock from the lumber yard, both hardwoods and softwood are good choices.

Note: Developing a good relationship with Your lumber suppliers is important. They can help guide you in making material selections as well as making special orders for a type of wood you may desire for a project.

Now that you have reviewed safety hints, learned the mistakes to avoid, reviewed the basic components and gathered your tools and materials for your projects - you are ready to BEGIN!

Steps to Follow:

For this project you can use scrap pieces of wood from other projects or a solid block of wood to create a beautiful box. The steps to follow for this project are:

1. Laminate the pieces of wood (if not using a solid block).
2. Cut the block to size.
3. Make the drawers.
4. Finish sand the drawers and carcass.

Laminate the Scrap Pieces of Wood

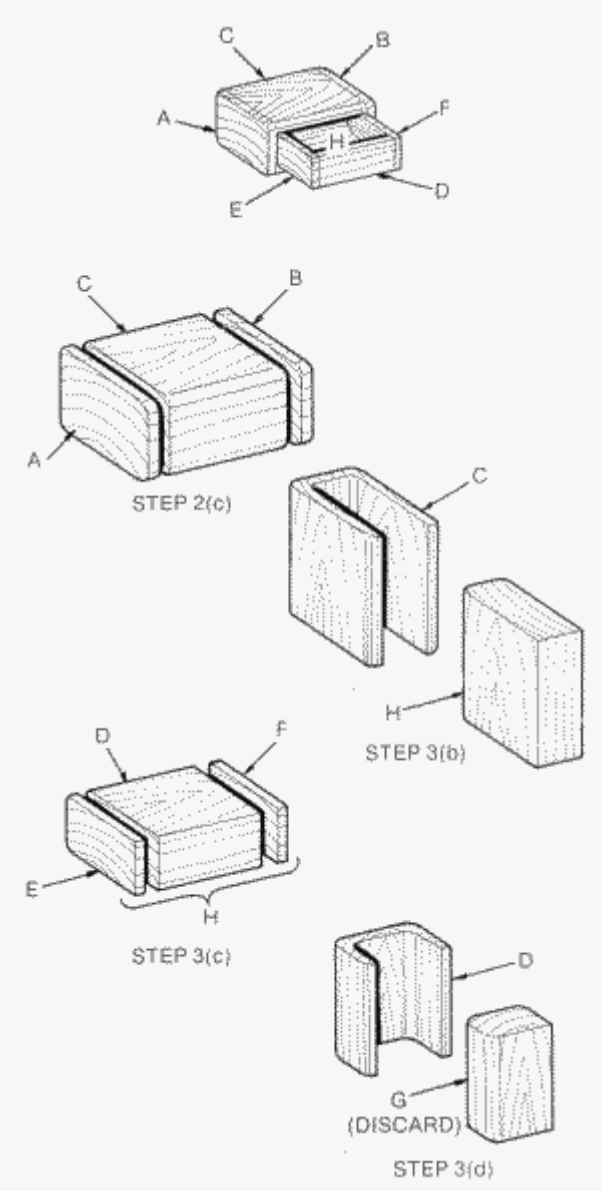
1. Stack scrap wood of approximate width and length together for a stack that can be cut by your band saw blade.
2. Use wood glue on the inside pieces of the stack and clamp together and set over night to dry. Alternating the grains is a nice touch depending on the wood scraps that you are using.

Cutting the Sides (A & B)

1. Using a ¼" width band saw blade cut the block to size. A ¼" blade will be used for all the following cuts because it will provide a tighter fit for the drawers and a neater cut.
2. Mark the sides of the box, a "V" will do so that later when you glue the box you know which side belongs where.
3. Using the band saw cut the sides off being careful to make the cuts straight and accurate for later assembling of the box. The tape makes this cut at ½" into the solid wood.

Making the Drawers

1. On the center block (C) mark the interior of the box for your drawer. Make the corners rounded so that the band saw will not bind when making the cut.
2. Cut out the drawer (H) making sure to go slowly and stay on the scrap side of the mark.
3. Cut off the sides of the drawers (E&F) being careful to mark their proper location for gluing later.
4. Cut the interior of the drawer out, again being careful to round the turns so that the band saw does not bind.
5. Sand lightly all the pieces before gluing on the sides.
6. F. Glue the sides on the carcass and the drawers. Use clamps to hold tight till the glue dries, over night is suggested.



Finish Sanding the Drawers and Carcass

1. Using a belt sander finish sand the carcass. This can be used to round the edges as well as smooth the glue joints on the carcass.
2. The belt sander and fine sand paper can finish the drawer. Make sure that as you sand, check the drawer often for smooth opening and closing.

CUTTING BOARD

Materials

Wood Selection

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Ask your Lumber supplier for assistance when purchasing your wood. Similar to laying a pattern out on a piece of cloth, often you can cut several different pieces of the same thickness of wood out of a single piece. It is a good idea to add up the total number of board feet, being careful to make sure you group short pieces in a board with long pieces to minimize waste.

This project could be built out of scrap wood already in your workshop. If you choose to use new stock from the lumber yard, both hardwoods and softwood are good choices.

Note: Developing a good relationship with Your lumber suppliers is important. They can help guide you in making material selections as well as making special orders for a type of wood you may desire for a project.

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These are the steps to follow for the cutting board:

1. Cut the stock
2. Laminate the boards
3. Finish the board

Cut the Stock

1. The block thickness is determined by the width you cut the individual pieces. Example: For a block to be 111 thick you will cut the stock 1" wide because of the lamination process which will glue the boards together.

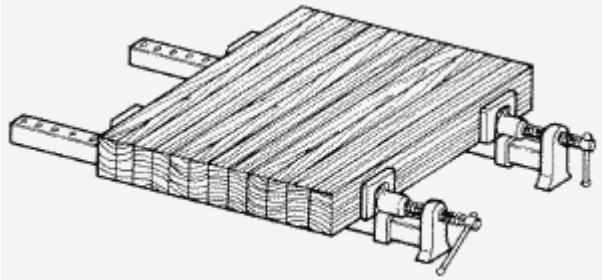
2. Cut the stock a little longer than you wish the length of the cutting board to be. You will cut the board to the finished side after it has been laminated and sanded.

Laminating the Stock

1. Use resorcinol glue on both sides of the stock to glue them together. Resorcinol glue is water proof and will provide stability if the board is soaked in water.
2. After gluing, clamp the boards together and let dry overnight.
3. Scrub off extra glue before it dries to prevent chipping the cuffing blades when finishing and shaping.

Finishing the Cutting Board

1. • After the board dries, take out of the clamps and use a belt sander to smooth the top and bottom surfaces.
2. Using a table saw or circular saw, cut the board to length. If using a table saw be sure that the cutting blade does not exceed 1/4" above the cutting board to prevent drag.
3. Using a shaper or router put around over edge on the top surface of the cutting board. Be careful to follow the guidelines reviewed in the tape.
4. Use a non-toxic finish such as mineral oil or a salad bowl finish for this project.



CUTTING BLOCK

CASSETTE HOLDER

Materials

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Now that you have reviewed safety hints, learned the mistakes to avoid, reviewed the basic components and gathered your tools and materials for your projects - you are ready to BEGIN!

Steps to follow:

1. Cut the wood to size.
2. Cut the dadoes for the shelves.
3. Bevel the shelves.
4. Drill holes for the rods. (Depending on the size of your sides you can have one or two sets of rods.)
5. Assemble the cassette holder.

Cut the Wood to Size

For this project there are two sides, two shelves, and rods. Wood from a lumber yard may not be square so square the ends before cutting the stock.

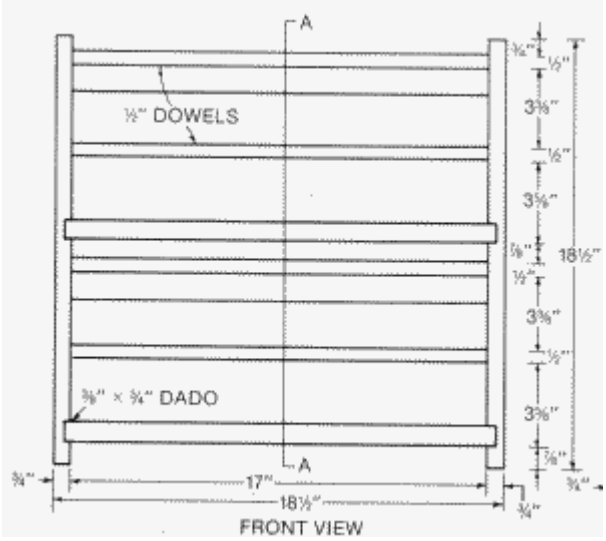
1. Crosscut the stock using a table saw with a stop block. Note: do not cut the shelves at this time because of the bevel cuts to be made later. Guide the wood through with the miter gauge. Note: Do not use a miter gauge with the rip fence as it may cause the wood to bind.

2. Rip the stock. Measure from the rip fence to the inside of the blade so that the cut is made on the scrap side of the wood and is the proper dimension.

Cut the Dadoes for the Shelves

Check your plans for the exact location of the dado cuts.

1. The dadoes on this project are cut at a 45 degree angle. Use a table saw with a dado set to make the cuts. A miter gauge with an extension fence and stop block will assure an accurate cut. A router with a guide board clamped at the correct angle can also be used to make the dado cuts. Note: Always start the router away from the wood and ease it up after the bit is up to speed, to make a clean cut.



Bevel the Shelves

Tilt the table or the table saw blade at a 45 degree angle. A circular saw can be used for this step by tilting the guide and blade at a 45 degree angle.

1. If you are using a circular saw, clamp on a guide to assure accuracy.

2. Check to make sure the angle is correct, and cut the shelves.

Drill the Holes for the Rods

Use a drill or a drill press to make the holes.

1. Measure according to the plans for the hole locations and mark them.

2. Set the depth for the hole to be drilled. A depth gauge can be made with a piece of tape wrapped around the bit if you are not using a stationary tool.

3. Drill the holes for the bars.

Assemble the Cassette Holder

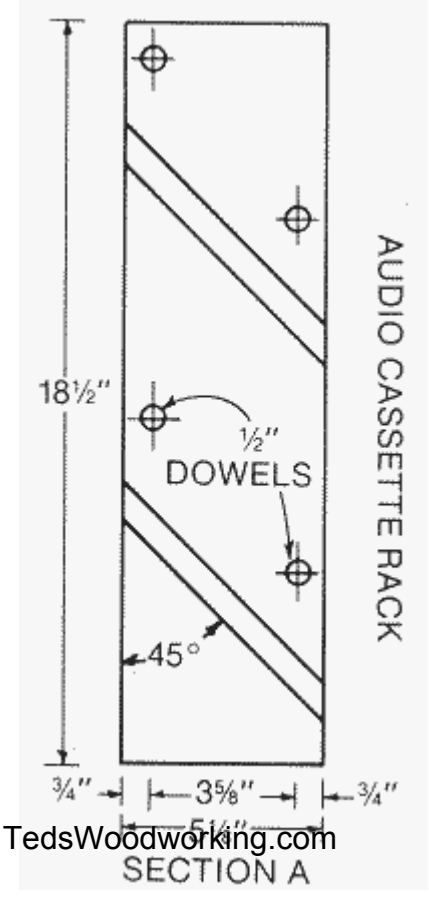
1. Sand the pieces before assembling.

2. Assemble the unit dry to check for proper fit.

3. Apply wood glue to all edges and rod ends. Then use clamps to hold tight while drying.

4. Apply finishing nails while drying for additional strength.

5. Sand the rack and apply the finish you have selected according to the manufacturer's instructions. There are helpful hints on finishing at the end of this pamphlet.



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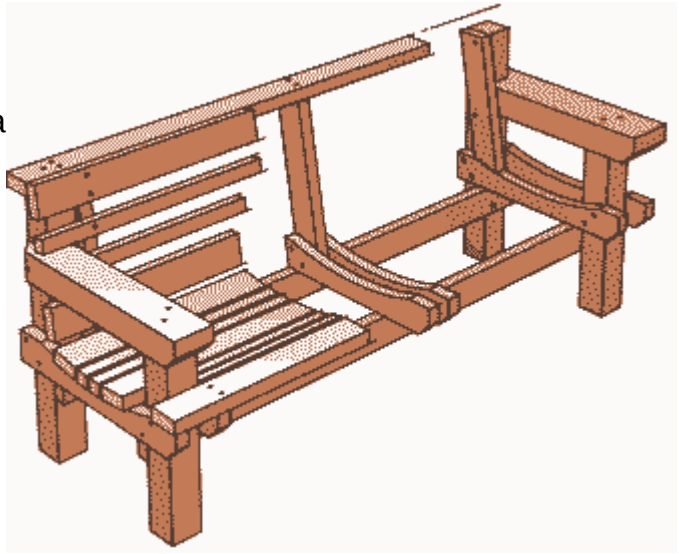
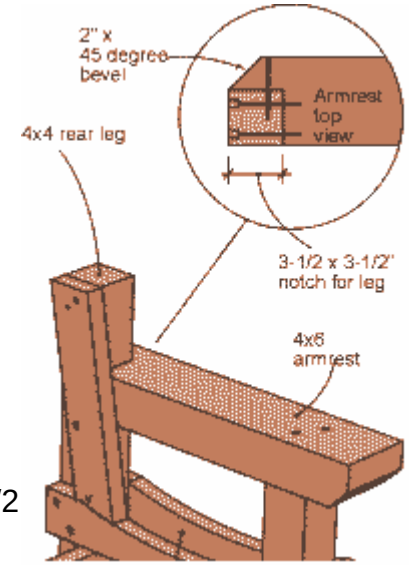
BENCH SEAT

The clean, horizontal lines and rich redwood tones of this bench design reflect the simple beauty of Northern California. Comfortable and elegant with a gracefully curved seat and angled backrest, it offers a standing invitation to sit, relax and enjoy. This freestanding bench uses Construction Common or Deck Common redwood grades that have a pleasing mix of heartwood and sapwood. Where increased decay resistance is needed, use all-heartwood grades: Construction Heart or Deck Heart. Use only corrosion-resistant deck screws to prevent staining. Counter-sink and plug screw attachments.



Materials for Benches

	Quantity	Size	Length
Top, Seat and Backrest Rails	6	2x4	6 feet
Seat and Backrest Rails	6	2x2	6 feet
Main Braces	2	2x4	5 foot 9 inches
Seat and Backrest Supports	9	2x4	26 inches
Front Legs	2	4x4	20-1/2 inches
Back Legs	2	4x4	30-1/2 inches
Armrests	2	4x6	26 inches
Deck Screws	1-1/2 pounds	3 and 4 inches	

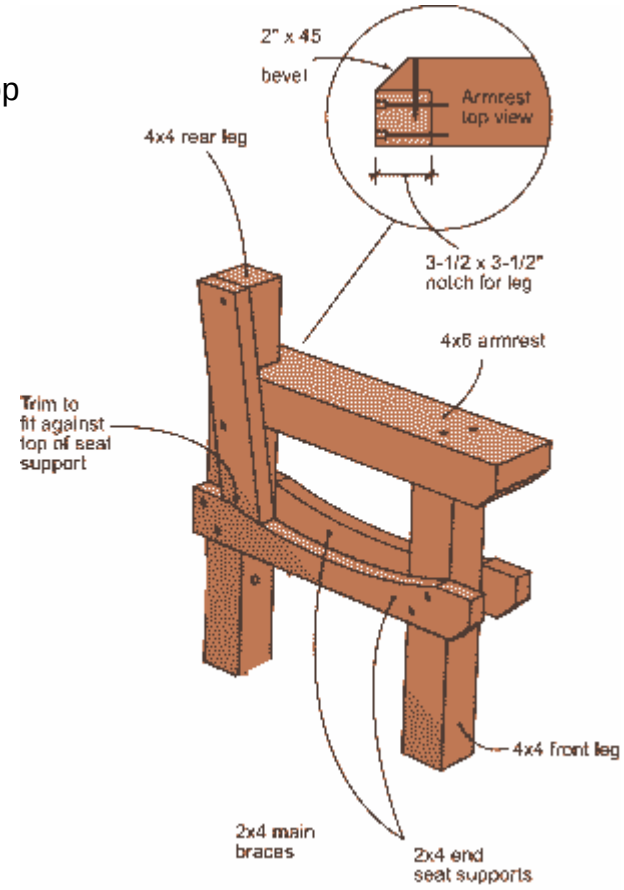


Trim and Notch the Armrests

Start building the bench by trimming and notching the armrests. Trim the front end of each 4x6 armrest at a 45 degree angle, beginning 1-1/2 inches down from top. Notch the inside back of each armrest where it will wrap the rear leg. Finish with a 45 degree bevel cut. See armrest detail.

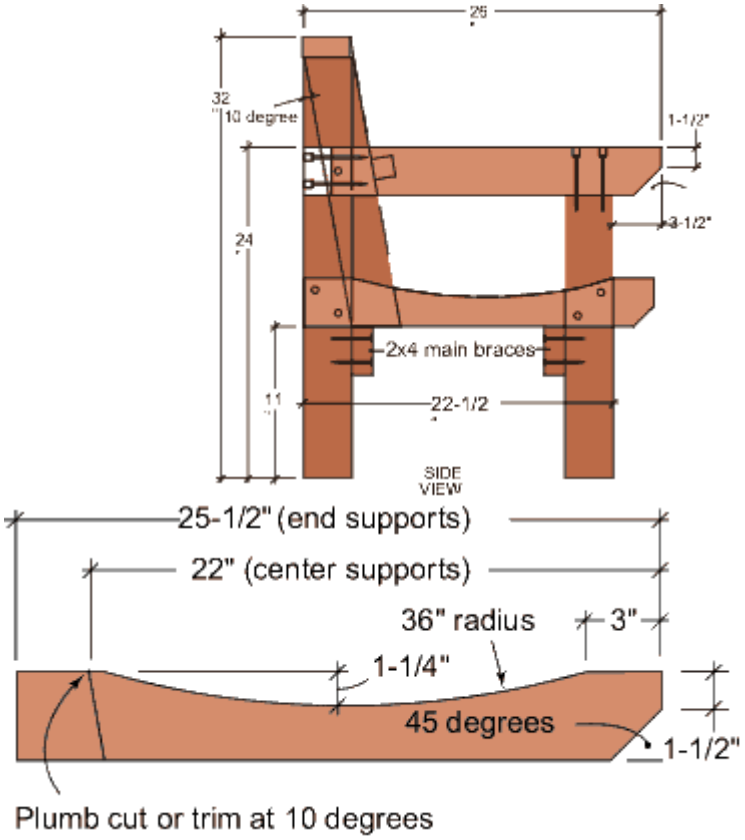
Prepare the Legs

Using 4-inch screws, attach armrests to 4x4 rear legs 24 inches up from the bottom. Attach armrests to front legs by driving two screws through the armrest and into the top of the leg.



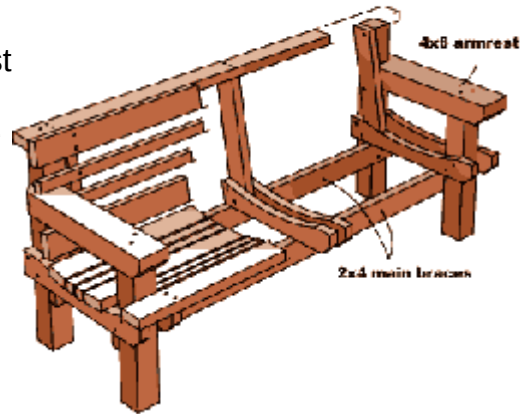
Main Braces

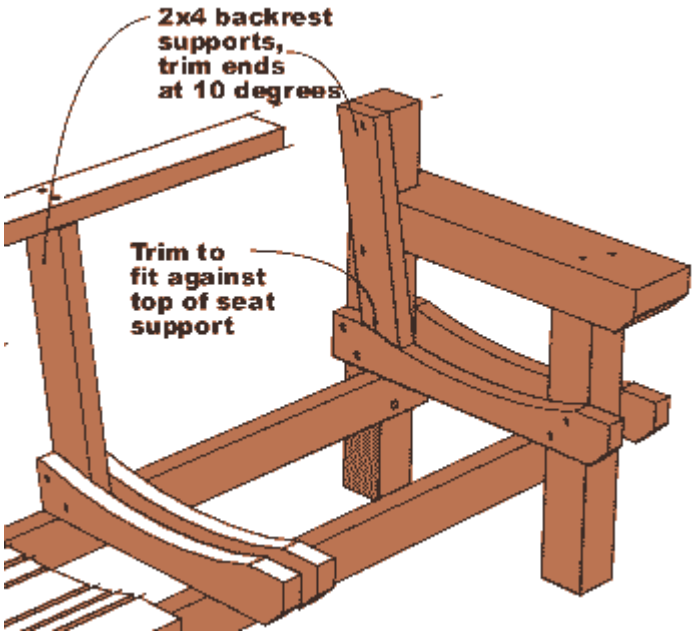
Trim 2x4s for the main braces and attach to inside front and rear legs 11 inches from bottom.



Seat Supports

The curved seat supports are made up of 2x4 lumber sandwiching either the 4x4 rear legs or the single 2x4 backrest support. To shape the curve, make a template for a 36-inch radius cut. Mark the cut to start 3 inches in from the front. Use a bandsaw to cut the radius to a depth of no more than 1-1/4 inches.

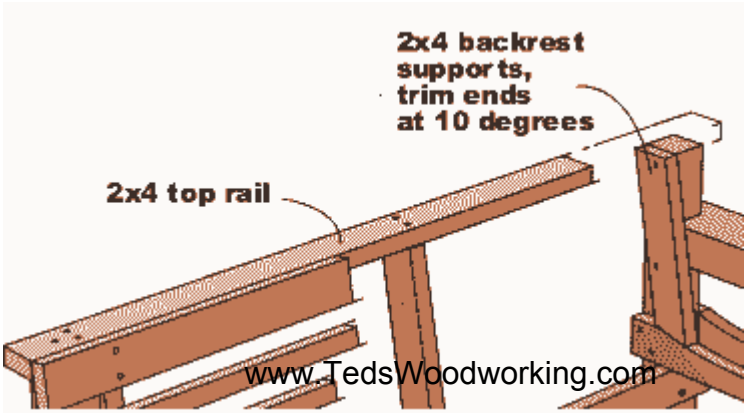




Finish the seat supports with a 45 degree bevel cut to match the armrests. Note that the end and center seat supports differ slightly in length and attachments. End seat supports Trim four 2x4s to 25-1/2 inches. Attach the inside seat supports to the rear and front legs so they rest on the top edge of the 2x4 main braces. Attach the outside seat supports level with the inside ones.

Center Seat Supports

Trim the two center seat supports to 22 inches. Using a scrap piece of 2x4 as a temporary spacer for the backrest, attach these seat supports across the main braces flush with the back edge of the rear brace. Use two 3-inch screws for each joint, angled from below and inside. Remove the spacer.



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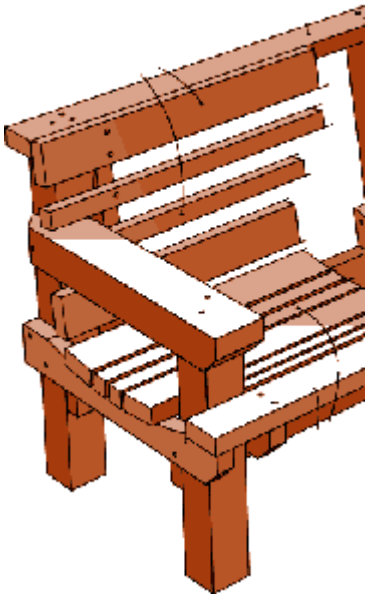
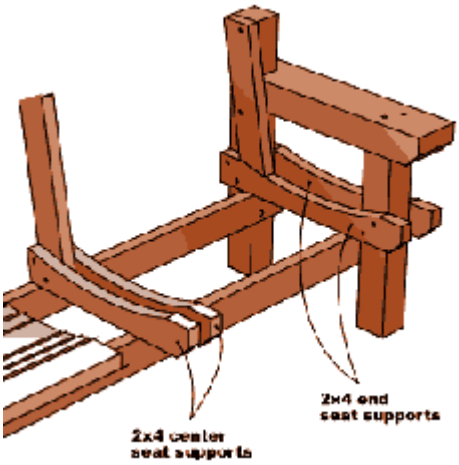
Backrest Supports

Trim the 2x4 backrest supports to a 10 degree angle at the top edge. The two end backrest supports start at the top of the 4x4 rear leg and trim to rest on top of the seat supports.



The center backrest trims flush to the bottom edges of the two center seat supports. Attach the end backrest supports to the inside of the 4x4 rear leg with two screws. The bottoms should fit snugly to the top of the seat supports and can be secured with screws driven at an angle from below. You should install the top rail before trimming and attaching the center backrest.

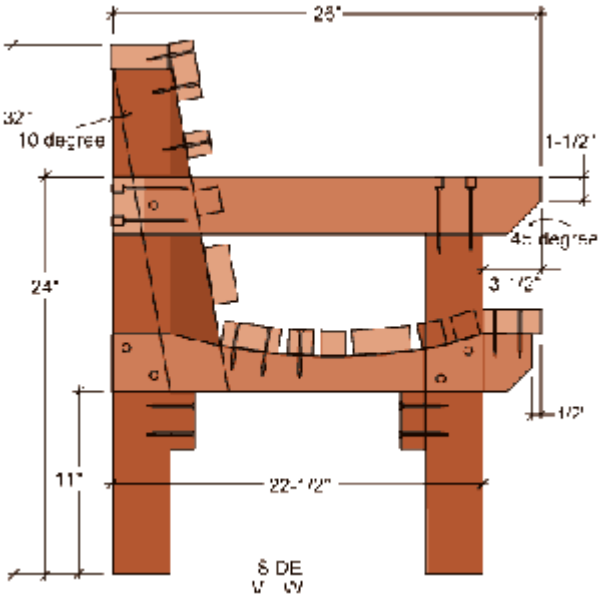


Top Rail

Attach the 2x4 top rail to the rear legs with three deck screws at each end. Measure and trim the center backrest. Install between the seat supports and flush to the underside of the top rail. Secure with screws.

Seat and Backrest Rails

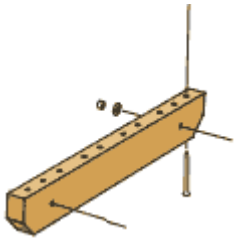
Trim one 2x2 backrest rail to fit between the armrests. Trim the other 2x2 and 2x4 seat and backrest rails to six feet. Install the front seat rail so that it overlaps the seat support by 1/2 inch, and attach with two deck screws at each joint.

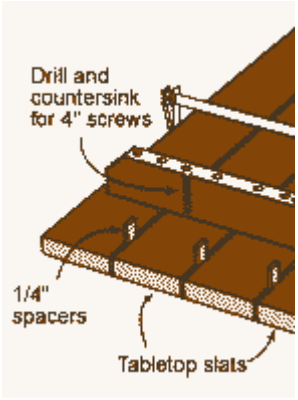


Attach the rear seat rail to each support with two deck screws. Adjust the spacing of the remaining seat rails before attaching. Space the backrest rails equally, and attach to supports with a single screw at each 2x2 and two screws at each 2x4.

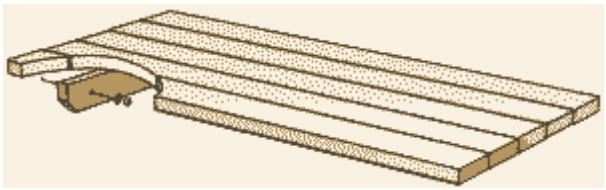
PICNIC TABLE

An excellent weekend project, this easy-to-build picnic table will soon become the focal point of your backyard. Redwood's beauty and durability will ensure countless summers filled with barbecues, picnics and outdoor parties.





The economical, knotty redwood garden grades, such as Construction Common or Deck Common, are great choices for building your table. For maximum durability, choose Construction Heart or Deck Heart.

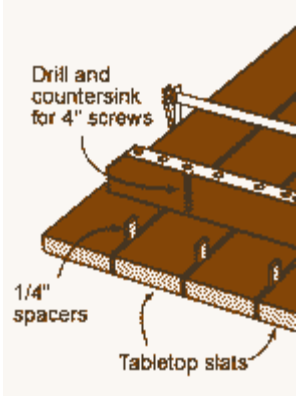


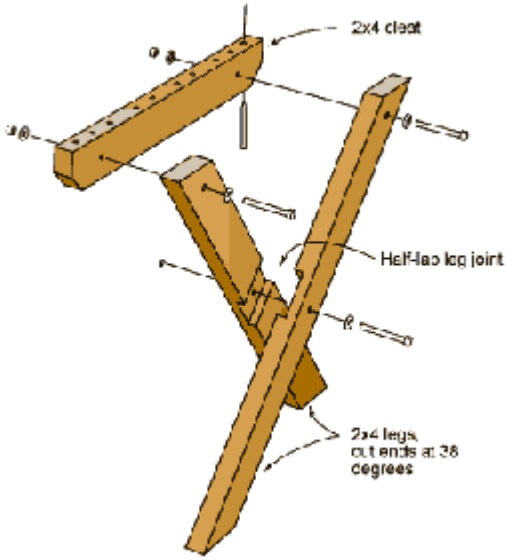
Materials for Table

	Quantity	Size	Length
Top Slats	5	2x6	60 inches
Cleats	2	2x4	27 inches
Legs	4	2x4	40 inches
Braces	2	2x4	30 inches
Machine Bolts, Washers and Nuts	6 sets	3-1/2 inches x 1/4 inch	
Deck Screws	1 pound	4 inches	

Build the Table Top

Measure and cut the 2x6 slats. Lay the slats on a clean and stable work surface with their most attractive sides down. Separate the slats with 1¼4-inch spacers and square. Clamp the slats together with a bar clamp.





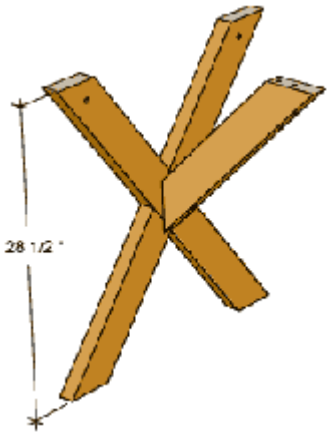
Fasten the Cleats

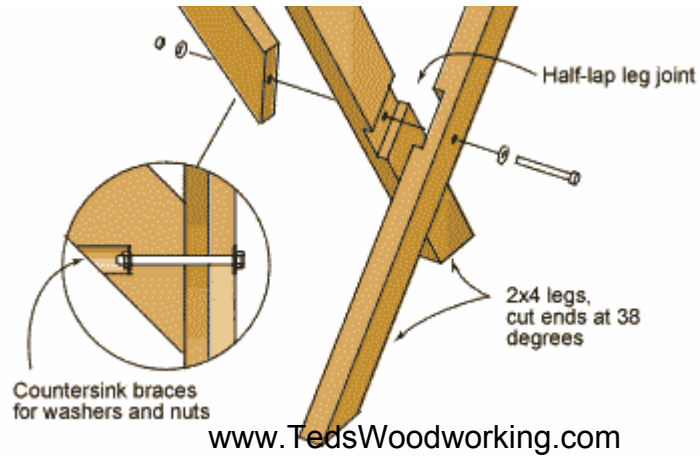
Cut the 2x4 cleats to 27 inches and trim the ends at 45 degree angles starting 2 inches down from top edge. Place a cleat on edge 7 inches from each end of the table top. Allow a 3/4-inch margin from the table's edges. With the combination countersink bit, drill two screw holes into the cleat above each slat, deep enough to set the screw heads below the surface. Fasten to slats with 4-inch screws.

Assemeble the Legs

Cut the legs to 39 inches with 38 degree parallel angles top and bottom. Loosely clamp legs together at their centers with C clamps. Adjust the tension in the clamp until you can open the legs to make a cross with a 28-1/2-inch span at each side, with tops and bottoms aligned. Mark along the sides of each leg where they cross. Remove the clamp and cut the half laps from each 2x4 leg. Reclamp the legs in position. Attach leg assemblies to table top cleat with two 3-1/2-inch x 1/4-inch machine bolts at each connection.

Attach the Braces and Legs





Mark and cut table braces to fit between the table leg assembly and the table top with 45degree angles at both ends. Attach braces to table top with 4-inch screws from below. Drill bolt holes through the “X” of the legs and completely through the angled ends of each 2x4 brace. Countersink the

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Teddy Bear Bank

MAKING THE TEDDY BEAR BANK

Having studied the working drawings for making the box and carefully selected your wood, set out the various dimensions and cut out the ten component parts—the four sides, the base, the top and the four inside-corner fillets. Cut the rabbets at the corners and glue up. Round over the edges of the base and lid with a quarter-curve profile and fit with countersunk screws.

Trace the side-view profile of the bear through to your chosen wood—best if it's a soft easy-to-carve timber like lime, jelutong or basswood—and cut it out on the scroll saw. Rerun this procedure for the front views. You should finish up with six parts—the head, the body, two arms and two legs. Drill 1/2"-diameter holes down through the body, up into the head, through the shoulder and into the arm, and fit stubs of 1/2"-dowel for the neck and for the jointed arm.

When you have made the basic parts for the bear, use a knife to swiftly whittle the cutouts to shape. Don't try for anything fancy, just go for uncomplicated and stylized chunky forms.

Finally, having first used a scalpel and sandpaper to tidy up and create a good finish, use a dash of black acrylic paint to detail the nose, eyes and mouth.

PUTTING IT TOGETHER

Once you have made the box and all the parts that go to make the bear, then comes the difficult task of putting the whole thing together. It's not so much that any single tage is difficult, but that everything has got to be just right. If one of the control strings is too slack, or the shaft is too tight, or whatever, then the movement won't work.

Start by running 1/16"-diameter holes through the neck and arm stubs. The neck needs a side-to-side hole for the pivot and a front-to-back hole for the control cords, while the arm needs a single front-to-back through-hole for both the control cords and the pivot strings. In essence, the controls are beautifully simple. There are four cords— one to pull the head down, one to pull the head up, one to pull the arm down and one to pull the arm up. And of course, depending upon how you want the action to go, fix either the "up" or the "down" cords to a lightweight tension "pulling" spring so the lever action becomes the positive movement.

Finally, when you are happy with the movement, cut two slots in the box (one for the lever and one for the coins), fit the shaft with its dowels and end plates, glue-fix the bear to the top of the box, run the control cords down into the box and then variously tie the cords to the spring or shaft.

MATERIALS LIST—

TEDDY BEAR

A Head (1)	2″×2″×2″
B Body (1)	2″×2″×3″
C Arms (2)	1″×¾″×3″
D Legs (2)	¾″×2″×3″

Note that all the above pieces are oversize and allow for cutting waste.

BOX

E Front (2)	3″×4¼″×6½″
F Shaft plates (2)	¼″×2″×2″
G Top (1)	½″×5½″×7½″
H Bottom (1)	½″×5¾″×7¾″
I End (2)	⅜″×5″×4¼″
J Corner fillets (4)	⅝″ triangular section at 4½″ long

HARDWARE AND EXTRAS

K Drive shaft (1) broomstick dowel—cut to fit
L Slot and lever bars (2) ¼″ dowel—cut to fit
M Strong cord—to fit
N Brass screws—various
O Small quantity of black acrylic paint

Note that all box measurements are to size.

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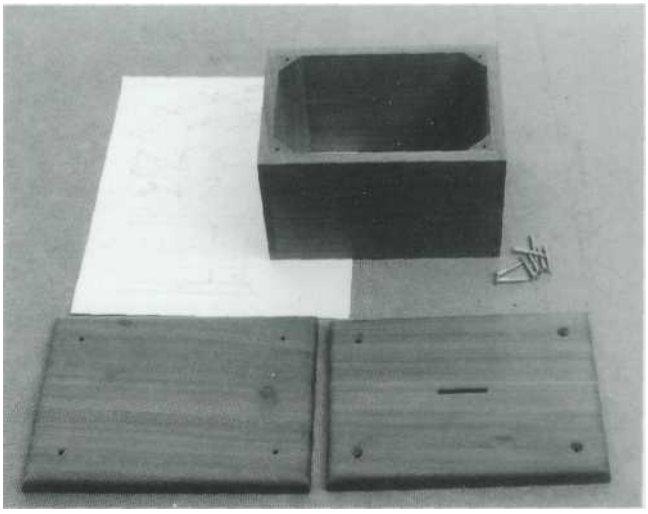
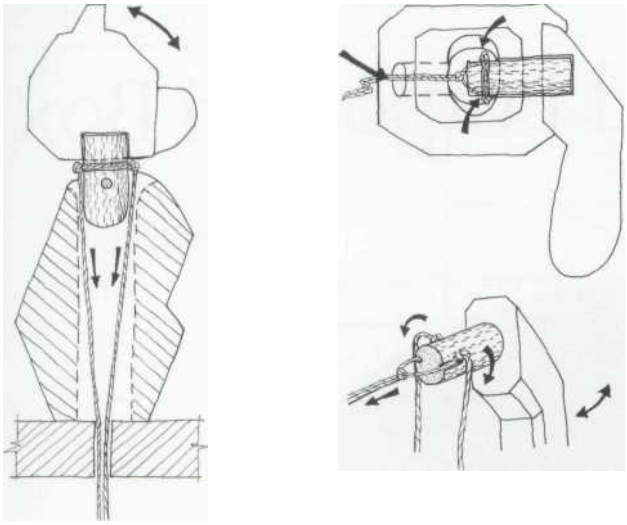
SPECIAL TIP: GLUING

For swiftly fitting and fixing all the control cords, you can't do better than a cyanoacrylate. It's good for holding the knots tight, for little trial-and-error holds, for fixing the bear to the top of the box. In fact, it's just about perfect for everything.

STEP-BY-STEP STAGES



The finished box, with the bottom and top slabs ready to fit. Note how the fixing screws are placed so they run into the corner fillets.



2. Next we string the bear. This cross section shows how the control cords operate the up-and-down movement of the head on the pivot. Be sure to use strong twine and nonslip knots. Notice the plan view at top right, show ing how the arm is both pivoted and controlled by the cords. A detail of the cord is shown at bottom right. See how one cord pulls and pivots the arm, while the other two cords operate the up-and-down movement.

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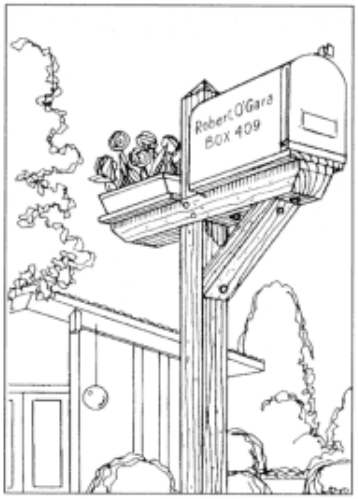
MAIL BOX STAND



Mailbox Stand and Planter

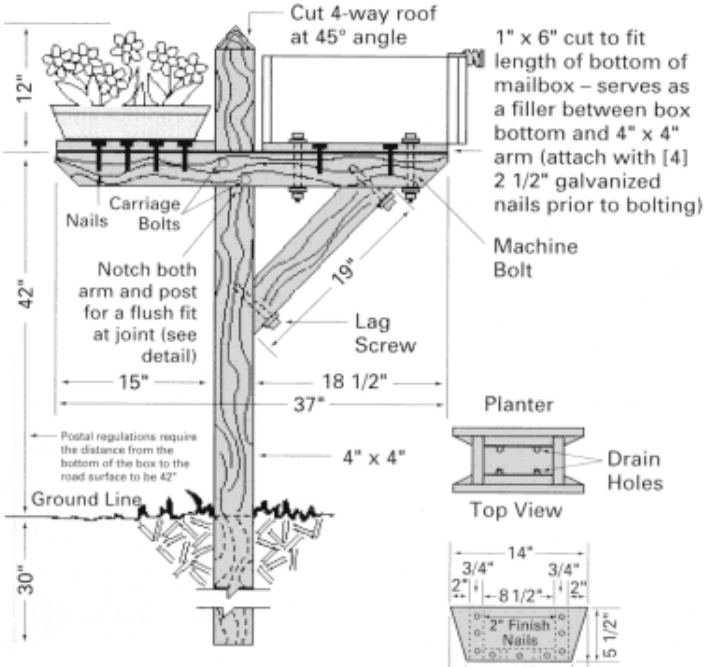
Lumber

Stand

- ▲ Post, Arm and Brace: (1) 4"x 4"- 12'
- ▲ Box and Planter Base: (1) 1"x 6"- 3'

Planter

- ▲ Sides, Ends and Bottom: (1) 1"x 6"- 4'



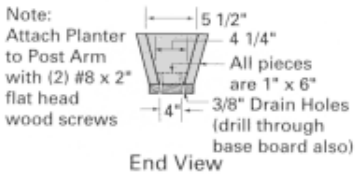
Hardware

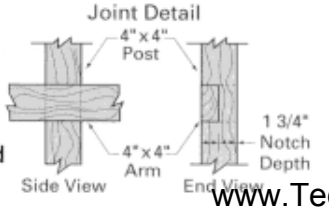
Stand

- ▲ Carriage Bolts with Nuts: (2) 5/16" x 4"
- ▲ Lag Screws: (2) 5/16" x 4"
- ▲ Machine Bolts with Nuts: (2) 5/16" x 5"
- ▲ Flat Washers (std.): (10) 5/16" I.D.

Planter

- ▲ 6d Galvanized Nails as Required





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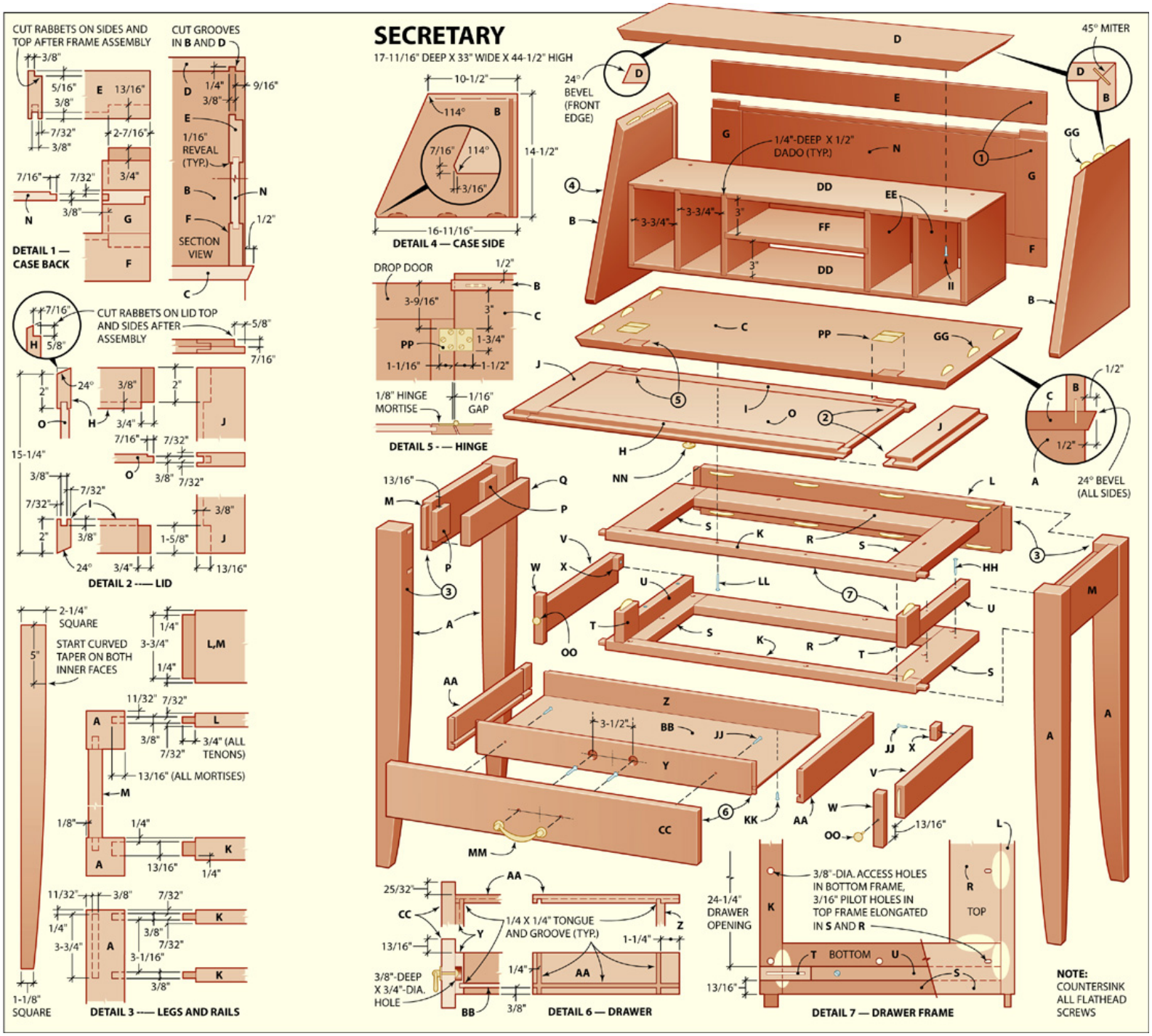
SHAKER STYLE TABLE



MATERIALS LIST--SECRETARY		
Key	**No.**	**Size and description (use)**
A	4	2-1/4 x 2-1/4 x 29-3/16" mahogany (leg)
B	2	13/16 x 14-1/2 x 16-11/16" mahogany (side)
C	1	13/16 x 17 x 33" mahogany (bottom)
D	1	13/16 x 10-7/8 x 32" mahogany (top)
E	1	13/16 x 2-13/16 x 30-7/8" mahogany (back rail)
F	1	13/16 x 2-1/2 x 30-7/8" mahogany (back rail)
G	2	13/16 x 2-13/16 x 10-1/8" mahogany
		(back stile)
H	1	13/16 x 2-3/8 x 27-3/8" mahogany (lid rail)

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I	1	13/16 x 2 x 27-3/8" mahogany (lid rail)
J	2	13/16 x 2-13/16 x 15-5/8" mahogany (lid stile)
K	2	13/16 x 1-5/16 x 29" mahogany (base rail)
L	1	13/16 x 4-1/4 x 29" mahogany (base rail)
M	2	13/16 x 4-1/4 x 13" mahogany (base rail)
N*	1	1/2 x 9-3/8 x 26" flakeboard (back panel)
O*	1	1/2 x 12 x 26-5/8" flakeboard (lid panel)
P	4	1/2 x 2-1/2 x 2-5/8" mahogany (spacer)
Q	2	13/16 x 2-5/8 x 11-1/2" mahogany (guide)
R	2	13/16 x 3 x 21-1/2" mahogany (frame rail)
S	4	13/16 x 3 x 12-13/16" mahogany
		(frame side)
T	2	13/16 x 2-5/8 x 3" mahogany (frame divider)
U	2	13/16 x 1-7/16 x 11-1/8" mahogany (blocking)
V	2	3/4 x 2-9/16 x 14-1/8" mahogany
		(lid support)
W	2	3/4 x 13/16 x 4-3/16" mahogany (facing)
X	2	1/2 x 1-1/8 x 1-1/8" mahogany (stop)
Y	1	1/2 x 2-9/16 x 23-11/16" mahogany (front)
Z	1	1/2 x 1-15/16 x 23-11/16" mahogany (back)
AA	2	1/2 x 2-9/16 x 14-1/8" mahogany (side)
BB	1	1/4 x 12-7/8 x 23-11/16" plywood (bottom)
CC	1	13/16 x 4-3/16 x 25-3/4" mahogany (drawer face)
DD	2	1/2 x 9 x 30-3/8" mahogany (insert top/bottom)
EE	6	1/2 x 7 x 9" mahogany (insert partition)
FF	1	1/2 x 9 x 12-7/8" mahogany (insert shelf)
GG	as reqd.	No. 20 plate
HH	4	2" No. 8 fh woodscrew
II	4	1" No. 6 fh brass woodscrew
JJ	4	1" No. 8 rh woodscrew
KK	3	3/4" No. 6 fh woodscrew
LL	10	11/4" No. 8 fh woodscrew
MM**	1	Drawer pull, Whitechapel No. 13PWLID
NN**	1	Lid pull, Whitechapel No. 76KSB2P
OO**	2	Support pull, Whitechapel No. 76KSP
PP**	2	Hinge, Whitechapel No. 166HISP

Making The Legs
We ripped the four legs from one board. First, crosscut the board a few inches longer than required and plane one edge straight and square. Use a circular saw and ripping guide to cut blanks slightly wider than specified so you can plane the edges smooth and to exact size. Rip each piece by cutting half the depth from opposite faces to reduce the strain on your saw (Photo 1).

Mark the mortise locations and use a router and edge guide to cut the side- and back-rail mortises (Photo 2). Use a block clamped across each front leg to guide the horizontal front-rail cuts. Square all the mortises with a sharp chisel.

Make a full-size template to transfer the tapering leg shape onto two sides of each leg blank. Then, use a sharp plane to trim the faces to the line. When all legs have been shaped, crosscut them to finished length.

Case Panels
The wide panels are made by gluing together narrower stock. We used a router table and a straight bit to true the edges for good joints. To joint stock in a router table, set up the fence to take a fine surfacing cut on the board edge. Then offset, through shims or adjustment, the outfeed side of the fence so it's aligned with the bit and will support the wood after the cut. Some commercial router tables have this feature built in. After adjusting the table for jointing, pass the mating edges of the stock past the cutter to trim them straight (Photo 3).

Use joining plates spaced 6 to 8 in. apart when gluing the panel pieces. After about 30 minutes, scrape excess glue from the surfaces and let the glue dry. Then, saw the panels to size with the appropriate beveled cuts (Photo 4). Keep the blade on the waste side of the layout line and plane the cut edges smooth.

Use a circular saw to create the leg blanks. Cut halfway through the stock, then flip it over to complete the cut.

Lay out the mortise locations and use a router and edge guide to cut the mortises. Square the ends with a chisel.

Shim the outfeed fence of a router table so it's aligned with the bit, and use your table to joint the stock edges.

After gluing up the panels, use a circular saw to cut the panels to size with the appropriate angled ends and edges.

Lay out and cut the joining plate slots at the miter joints between the top and sides, and the joints between the bottom and sides. Then, rout the grooves in the side and top panels that house the case back. Rip and crosscut frame parts for the case back and drop-front lid to specified dimensions. At the same time, cut the rail stock for the desk base to finished size.

Rout the tenon cheeks on the back-frame stiles, lid rails and base rails with a 3/4-in. straight bit and router table (Photo 5). A scrap board behind the workpiece prevents tearout at the end of the cuts. With the cheeks shaped, use a backsaw to cut the shoulders at the top and bottom edges of the base rails.

Install a 3/8-in.-dia. bit in the router table and cut the grooves along the inside edges of the door and back-panel parts. Re-adjust the height of the bit to cut the mortises in the ends of

Cut all of the tenons with a router table and miter gauge. Use scrap stock behind

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the back rails and lid stiles, and square the mortise ends with a sharp chisel. Rout the rabbets around the back and lid panels, and test the fit of the panel edges in the frame grooves.

Apply glue to the back mortise-and-tenon joints and assemble the stiles to the bottom rail. Slide the panel into position (Photo 6) and then add the top rail. Check for square, and assemble the lid in a similar manner.

Saw the beveled edges at the top and bottom of the door. Then, rout the rabbets around three sides of the back panel and along the top and ends of the door.

Case Assembly

Apply glue to the case miter joints, slots and plates, and join the sides to the top. Clamp the parts in both directions to pull the joints tight (Photo 7), and check that the assembly is square.

Slide the back panel into the grooves (Photo 8), and join the sides to the case bottom panel.

the work to prevent splintering.

Assemble the back-panel rail and stiles, then slide the panel in its groove and add the remaining rail.

Apply glue and clamp the sides to the top. Clamp in both directions and check that the assembly is square.

Slide the back panel into the grooves in the case sides. After the glue dries, join the bottom to the sides with plate joints.

Building The Base

Spread glue on the side-rail/leg joints and clamp each side subassembly. Cut the spacer blocks and guide strips to size, and glue them to the side rails as shown in the drawing on the first page.

Cut the parts for the drawer frames to size, and add the joining plate slots. Spread glue on the frame joints and assemble the top and bottom frames. Then, use plate joints to attach the frame divider. Bore and countersink pilot holes in the drawer guide strips, and secure them to the bottom frame with screws (Photo 9).

Lay out and cut the plate slots for joining the back rail to the drawer frames. Also, bore and countersink holes in the top frame for mounting the case. Note that some of the holes in the top frame are elongated to allow the case bottom to expand and contract. Then, bore access holes in the bottom frame.

Join the top frame to the bottom frame assembly, and then join the back rail to both drawer frames. When the glue has set, join the drawer-frame/rail assembly to the two leg subassemblies (Photo 10).

Cut the lid supports and facing strips to size and join the parts with plates and glue. Cut the stopblocks from 1/2-in.-thick stock and bore the pilot holes for securing them to the supports. Slide each support into its slot and fasten the stopblock. You'll remove the stop when it comes time to apply the finish. Place the case on top of the desk base, and fasten the parts temporarily.

Lay out the hinge locations on the case bottom and door. Use a sharp chisel to cut the mortises (Photo 11). Mount the hinges and test the operation of the door. If it binds against the case side, simply sand or trim the side or door rabbet until it works smoothly.

Drawer And Storage Insert

Cut the drawer parts to size and use a router table to make the joints. Apply glue to the sides, front and back, and then assemble the box and check for square. Slide the bottom panel into place and screw it to the drawer back.

Mount the drawer pull to the drawer face, and screw the face to the drawer box. Test the fit of the drawer in its opening and trim where necessary. Then, temporarily mount the lid pulls and the support pulls.

Cut the parts for the storage insert and rout the dadoes in the top, bottom and center partitions. Apply glue and assemble the parts (Photo 12). Bore and countersink screwholes in the top of the insert, slide it into position and screw it to the case top.

Finishing

Disassemble the secretary and sand all parts with 120-, 150-, 180- and 220-grit sandpaper. To achieve a smooth finished surface, we applied Behlen Pore-O-Pac filler before staining. First, thin the filler with filler solvent until it has the consistency of thick cream. Working on only a small area at a time, brush the filler into the woodgrain and let it set until it appears dull. Rub the filler off the surface and into the grain with burlap cloths and remove all excess. Allow the filler to dry overnight and sand lightly to remove any residue.

To achieve a deep reddish brown, we applied Behlen Solar Lux Medium Brown Mahogany stain. This is a solvent-based dye that dries quickly, so it's best to add Solar Lux retarder to slow the drying time and prevent lap marks. Let the stain dry overnight before applying the first coat of finish.

For our surface finish, we applied three coats of Waterlox Original Sealer/Finish. Liberally soak the wood surface with finish and wait about 20 minutes before wiping off the excess. After overnight drying, lightly sand the surface with 320-grit sandpaper and dust it off thoroughly before applying a second coat. Apply the final coat using the same technique. When the last coat is dry, rub the surface with 4/0 steel wool to remove any dust nibs and give the piece a warm glow. Polish with a soft cloth. Reassemble the desk and install the hardware. To ease drawer and door-support operation, apply a light coat of paste wax to the parts and then polish.

ADIRONDACK CHAIR

Overview: Adirondack chairs can be made from a variety of woods. The most common wood used in their construction is 5/4 pine. My recommendation is to use southern yellow pine (SYP) because it's high resin content makes it naturally resistant to decay. If you have

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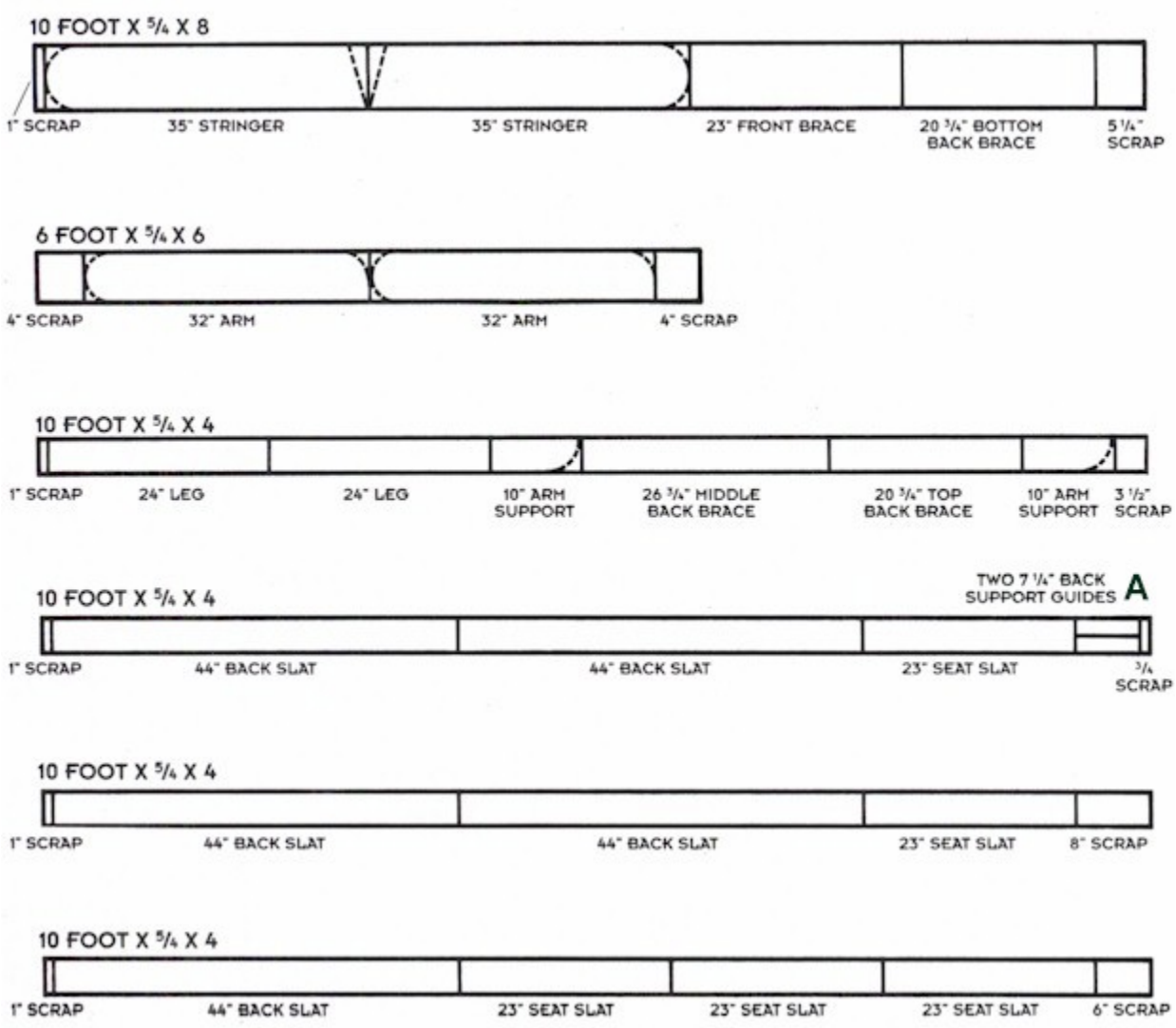
trouble locating 5/4 SYP look for pine stair tread material. Stair tread material comes almost free of knots because it comes from the center of the tree. Let's get started...

Step 1: Mark and cut your materials per the cutting diagram on the next page. Sand and smooth each piece in preparation for assembly.

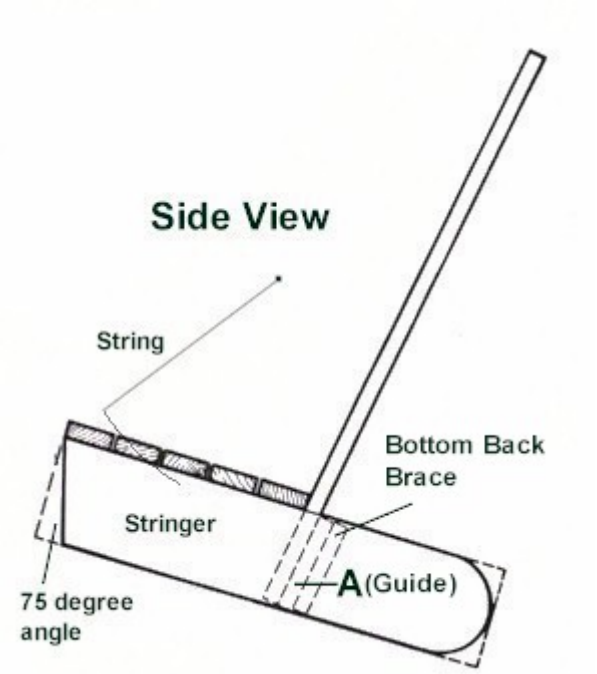
Wood Cutting Diagram



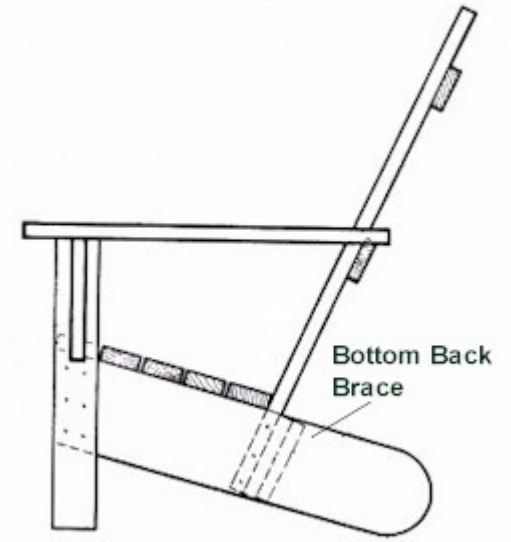
Step 2: After the wood is cut and sanded it's time to start assembly. We start with the two back legs (which we are calling stringers) The 2 stringers are the heart of the chair as they hold everything else together.

Use wood screws that are 1 5/8" to 1 3/4" long for all assembly, except where noted. Always pre-drill the holes to prevent splitting.

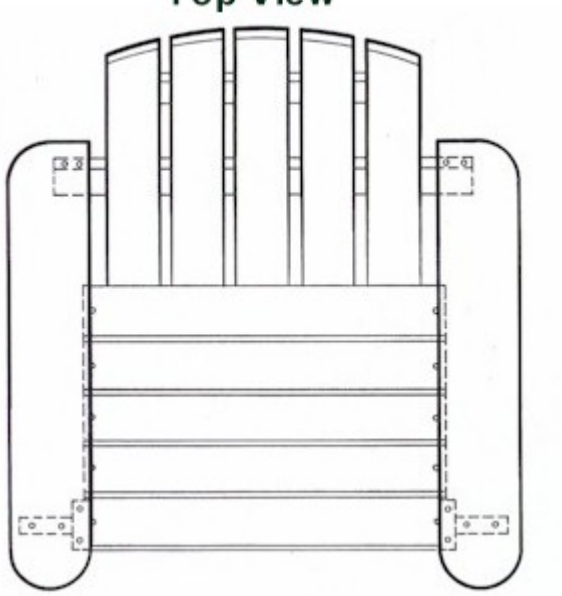
Note: Most assembly will be simply fitting the appropriate pieces together. The guides at location "A" (drawing on right) are noted on wood cutout diagram above.

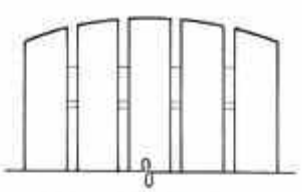


The string shown in the drawing above indicates how to cut curves for the seat or the back (if desired).

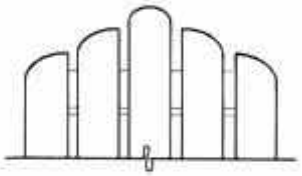


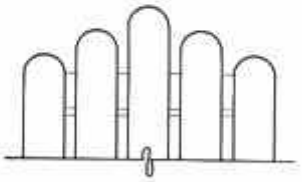
Top View

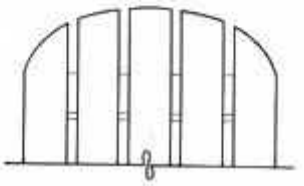




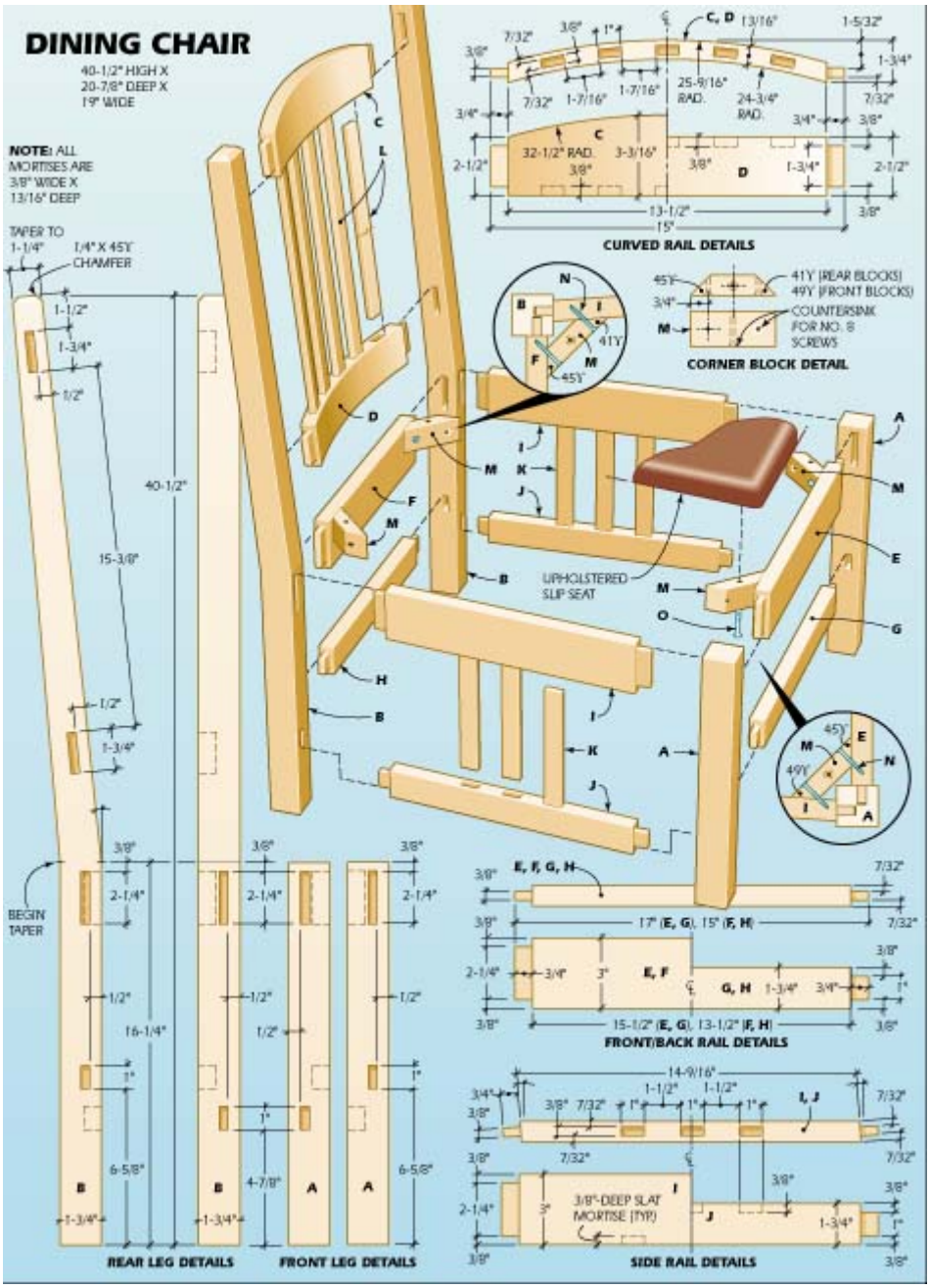
Back Styles







ARTS AND CRAFTS CHAIR



MATERIALS LIST--DINING CHAIR		
Key	**No.**	**Size and description (use)**
A	2	1-3/4 x 1-3/4 x 16-1/4'' oak (front leg)
B	2	1-3/4 x 3-3/4 x 40-1/2'' oak (rear leg)
C	1	1-3/4 x 3-3/16 x 15'' oak (top rail)
D	1	1-3/4 x 2-1/2 x 15'' oak (bottom rail)
E	1	13/16 x 3 x 17'' oak (top front rail)
F	1	13/16 x 3 x 15'' oak (top back

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		rail)
G	1	13/16 x 1-3/4 x 17" (lower front rail)
H	1	13/16 x 1-3/4 x 15" oak (lower back rail)
I	2	13/16 x 3 x 16-1/4" oak (top side rail)
J	2	13/16 x 1-3/4 x 16-1/4" (lower side rail)
K	6	3/8 x 1 x 7-3/4" oak (side slat)
L	5	3/8 x 1 x 15-3/8" oak (back slat)
M	4	13/16 x 1-1/2 x 3-5/8" (corner block)
N	8	1-1/2" No. 8 fh woodscrew
O	4	2-1/4" No. 8 fh woodscrew
Misc.: Medium Fumed Oak aniline dye (No. W1190)		

Making The Parts

Begin construction by ripping and crosscutting stock to size for the front legs. Then, cut two 4 x 42-in. blanks for the rear legs. Make a cardboard template for the rear legs and trace around it to transfer the shape to each blank. Saw to the waste side of the line with a band saw or sabre saw, and use a sharp plane to trim each leg square and to finished dimension (Photo 1).

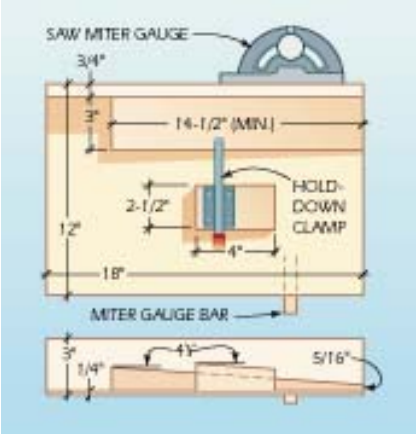
Mark the mortise locations on all legs. To make this job easier, clamp several legs together with the ends held even and mark across them using a straightedge or square as a guide. Install a 3/8-in.-dia. spiral up-cutting bit in your router, and use an edge guide to rout the mortises in the legs (Photo 2). Square the rounded mortise ends with a sharp chisel.

Cut blanks of 1-3/4-in.-thick stock for the curved back rails. Before cutting their curved profiles, use a table saw and dado blade to cut the tenons at the ends of the pieces (Photo 3). Note that the tenons are not centered across the thickness of the blanks. Cut one side of all the tenons first, then readjust the blade height to cut the other side. It's best to cut the tenons about 1/32 in. thicker than indicated, and then use a sharp chisel to pare the surfaces smooth and bring the tenons to finished dimension.

Make a cardboard template for the back-rail shape and use it to transfer the shape to each blank. Use a band saw to cut the inside curve of each rail (Photo 4). Then, remove the saw marks and smooth the curved shape with a spokeshave (Photo 5). Go back to the band saw to cut the outside curve and smooth that surface with either a block plane or spokeshave. Don't cut the arched profile of the top rails at this time.

Cut stock for the lower front and back rails to finished dimension and use a dado blade in the table saw to cut the tenons. Readjust the blade height and hold the rails on edge to cut the top and bottom shoulders at each rail end.

Next, cut stock to size for the side rails. Study the drawing to be sure you understand the angled tenons on these pieces. Label each rail with its



ANGLED-TENON JIG

After sawing the rear leg shape, use a sharp plane to remove saw marks and trim the leg to exact size.

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location in the chair to avoid confusion when it comes time to cut the joints.

We built a jig to cut the angled tenons. To make the jig, first attach a hardwood fence to a plywood base, and then screw the assembly to your table saw miter gauge. Glue up four pieces of 3/4-in.-thick stock and band saw the stack into a ramp with an angle of 4°. Screw the ramp to the plywood base. To use the jig, hold a rail on the ramp and push the jig past the dado blade. We used a holddown clamp mounted on a tapered hardwood block to hold the workpiece.

Mark the mortise locations in the chair legs, and use a plunge router with an edge guide to cut the mortises.

Use a table saw and dado blade to cut the tenons in the blanks for the curved back rails. These tenons are not centered.

Lay out the back-rail curve onto the edge of each rail blank. Then, cut the inside curve on the band saw.

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Use a spokeshave to smooth the inside curve of the back rail, and then cut and smooth the outer curve.

Cut one surface of each tenon with the ramp angled down toward the dado blade (Photo 6). Then, secure the ramp in the opposite direction and readjust the blade height for the opposite side of each tenon (Photo 7). If you're using the holddown clamp, you'll need to remount it. Then, use the miter gauge without the jig to make the angled cuts for the top and bottom shoulders of the side rails (Photo 8). Cut strips for the side and back slats. Crosscut the slats to finished length, and set them aside.

Lay out the slat mortises in the side rails and in the curved back rails. Mark the side-rail mortises by clamping several rails together and marking across the stack with a square. Mark the curved rails individually.

Install a 5/16-in.-dia. bit in the drill press and bore slightly overlapping holes to remove most of the waste from the mortises in both the curved and straight rails (Photo 9). Then, use a sharp chisel to pare the walls and square the ends of the mortises (Photo 10). Test a slat in each mortise--the fit should be snug. Make another template for the arched shape of the top back rail and use the template to trace the shape onto the workpiece. Use a sabre saw to cut the profile (Photo 11).

To cut the angled tenons on the side rails, support the stock in a table saw jig that holds the work at a 4° angle.

When cutting the opposite tenon faces on the rails, reverse the ramp on the jig and readjust the dado blade height.

Finish the rail tenons by cutting the top and bottom shoulders with the miter gauge and dado blade.

Use a 5/16-in.-dia. bit to bore slightly overlapping holes to remove most of the waste from each slat mortise.

Trim and square the slat-mortise walls with a sharp chisel. Then, test fit the slats--they should be quite snug.

Use a template to lay out the arched profile of the upper back rail. Then, cut to the line with a sabre saw and smooth.

Mark the shoulders on the top and bottom edges of the curved back rails and use a small backsaw to make the cuts (Photo 12). First, make the cuts into the endgrain of the tenon. Then finish the shoulder by cutting across the grain.

Place guide marks for the 1/4-in. chamfer at the top end of each rear leg. Clamp a leg in the bench vise and use a sharp block plane to cut the chamfers.

Assembly
First, sand all parts with 120-, 150-, 180- and 220-grit paper, dusting off thoroughly between grits.

Spread glue on the mating surfaces for the front-leg/front-rail joints. Use a small shim to spread glue in the leg mortises and a small brush for the tenons. Spread the glue sparingly on the tenons to avoid excessive squeeze-out at the joints.

Join the rails to the front legs, then clamp the joints and compare opposite diagonal measurements to be sure the assembly is square (Photo 13). Let the glue set for about 20 minutes and use an old chisel to pare off any excess glue.

Next, insert the side slats in the mortises of the bottom side rails and position the top side rail over the slat ends. While you don't need glue in the slat joints, a drop of glue in a loose joint will keep the slat from rattling. Temporarily clamp the rails and slats (Photo 14).

Spread glue in the open mortises of the front-leg assembly and on the front tenons of the side rails, and join the side rails to the legs (Photo 15).

Join the back slats to the curved rails (Photo 16) and temporarily clamp the assembly. Again, it's not necessary to glue these joints unless a slat is loose in its mortise.

Spread glue on the tenons of the back rails and in the matching mortises in the back legs. Join the rails to the legs, clamp and compare opposite diagonal measurements (Photo 17).

Cut the shoulders of the curved back rail tenons with a small backsaw. First cut in from the end, then across the grain.

Join the front rails to the legs, and clamp. Compare opposite diagonal measurements to check for square.

Join the side slats to the rails. It's not necessary to use glue since the slats are held captive between the rails.

Spread glue on the rail and leg mating surfaces. Join the side rails to the front leg assembly and clamp.

Join the back slats to the curved rails. If a slat is too loose in its mortise, add a drop of glue to keep it from rattling.

Join the back rail and slats to the legs. Apply the glue sparingly, clamp, and check that the diagonals are equal.

Once the glue has set on the subassemblies, complete the chair frame by joining the side rails to the back-leg assembly. Spread glue on the mating surfaces and position the joints. Apply clamps to pull the joints tight. Set the chair upright on a flat worktable to be sure that all four legs sit evenly (Photo 18). Adjust the clamps and joints, if necessary, until any rocking is eliminated.

Cut corner blocks to reinforce the joints and provide a means for attaching the seat. Note that the angles for the blocks at the front of the chair are different than those for the rear blocks. Use a miterbox to cut the blocks. If your miterbox won't handle the 41° angle for the rear blocks, make the cuts on a band saw.

Bore and countersink pilot holes through the width of the blocks for attaching the seats. Use a clamp to hold each block in place while you bore and countersink pilot holes for attaching it to the rails (Photo 19). A combination bit and countersink is the most efficient tool for the job. Fasten the blocks to the rails with 1-1/2-in. No. 8 screws.

Join the back subassembly to the front-leg/side-rail assembly. Work on a flat surface so the legs remain even.

Finishing

First inspect each chair for scratches, and sand if necessary. We used a water-soluble aniline dye for a beautiful, clear and lightfast color. To eliminate raised grain problems, wipe the chairs with a sponge dampened with clean water. Let the wood dry completely and lightly sand the surface with 220-grit paper.

Follow the manufacturer's directions for mixing and applying the dye, and be sure to allow sufficient drying time before applying a finish.

For our finish, we used Waterlox Original Sealer/Finish. Brush or wipe on the first coat, which will soak into the wood readily. Allow the finish to dry overnight. Lightly sand with 320-grit paper and remove all dust. For the next and subsequent coats, apply the finish and let it sit for about 30 minutes before wiping off any excess. Then, let the finish dry overnight. At this point, you will sand between coats only if the finish is rough. After three or four coats, burnish the surface with 4/0 steel wool to remove any rough spots, and polish with a soft cloth.

Finally, attach the finished slip seats to the frames with screws installed through the corner blocks into the underside of each seat.

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KENTUKY CHAIR

You start with three six foot 2x4s (I used pressure treated pine), ripped into nine equal 1 1/2 x 1 1/8 pieces. By judicious measuring, this should yield the following:

Seat: (A) 6 pieces 15" long) each piece has two 1/4" holes
(B) 2 pieces 35" long) drilled in the center of the wider side.Measure from the same end:
1st hole 1 1/2";
2nd hole 12".
(C) 9 pieces 9 5/8" long: Two holes, 1 1/2" from each end.

Back: (D) 4 pieces 31 1/2" long) Each piece has two holes, at
(E) 2 pieces 29" long) 1 1/2" and 25" measured
(F) 2 pieces 42" long) from the same end.

All held together with 9 gauge galvanized wire..

Align seat pieces as : A-A-B-A-A-B-A-A and hold together loosely at top with a length of wire through the upper (1 1/2" holes); At the lower (12")holes, intersperse each piece with a length of C. That is:

C-A-C-A-C-B-C-A-C-A-C-B-C-A-C-A-C. Wire and set aside.

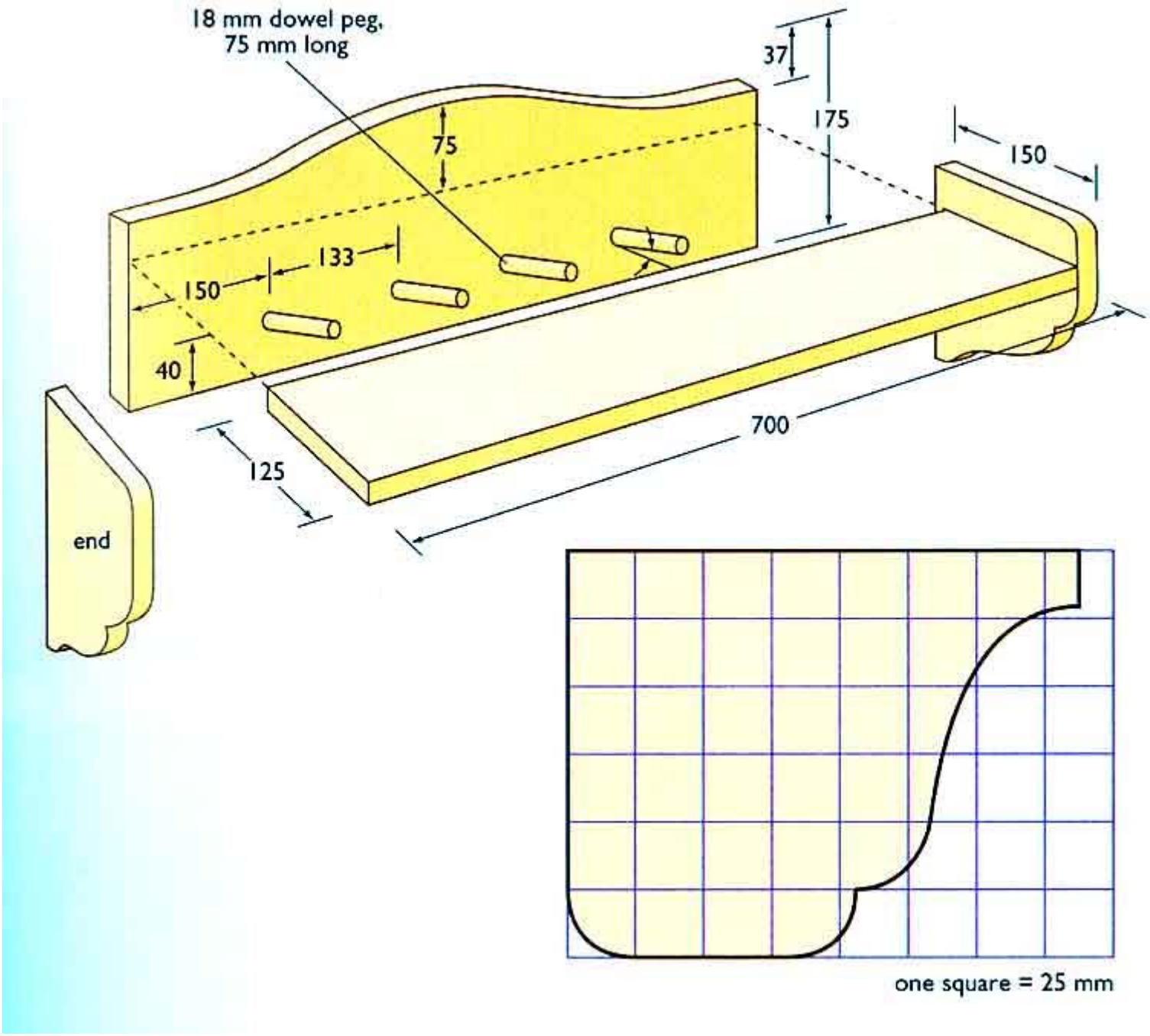
Align back pieces in the order F-D-E-D-D-E-D-F, and again hold together loosely with a wire through the holes which are 1 1/2 from the end.

Now marry the two parts by threading wire through the remaining holes, with the C pieces acting as the connectors. The new joint should have the configuration: C-F-C-D-C-E-C-D-C-D-C-E-C-D-C-F-C.

Draw all wires tight, cut off and secure ends somehow (I threaded them and used cap nuts).

Now take it all apart, sand as appropriate, finish as desired and reassemble.

BATHROOM SHELF



Item	Material
shelf (1)	140 x 19mm timber, cut and planed to measure 700 x 125mm
shelf back (1)	190 x 19mm timber, cut and planed to measure 700 x 175mm
shelf ends (2)	165 x 19mm timber (or 2 offcuts measuring 200 x 150mm)

You'll also need: 5 x 30mm countersunk screws; 4 x pieces 18mm dowel, each 75mm long; waterproof epoxy resin (if using in bathroom) or PVA glue; 120 grit sandpaper; polyurethane gloss varnish; fasteners to fit shelf to wall.

Here's how:
1. Click on the illustration at the top of this story to get a larger diagram. Transfer pattern for shelf end to graph paper. Cut out all the components as shown in the diagram. Plane to correct width. Use a jigsaw to cut the two shaped ends. Give the edges a rustic irregularity with a spoke shave or plane.

2. Drill and insert 30mm-long countersunk screws in three places through the back into the rear edge of the shelf and twice through each of the sides into the shelf ends.

3. Drill four 18mm peg holes 40mm up from the bottom (see diagram for spacing). Allow the drill to rest against the bottom of the shelf as you proceed. This will give your pegs an even upwards tilt. Glue and insert pegs.

4. Sand and triple-varnish the shelf before fixing it to the wall through the upper back using appropriate fasteners for the wall type.

SMALL BOX SHELF

You'll need

Part	Material	Length
End (2)	150 x 25mm timber, DAR	148mm
Top/bottom (2)	150 x 25mm timber, DAR	240mm
Rail (1)	50 x 25mm timber, DAR	240mm

You'll also need: 40mm nails (12); PVA adhesive; wood putty; 50mm x 8 gauge countersunk screws (2) or hollow wall anchors.

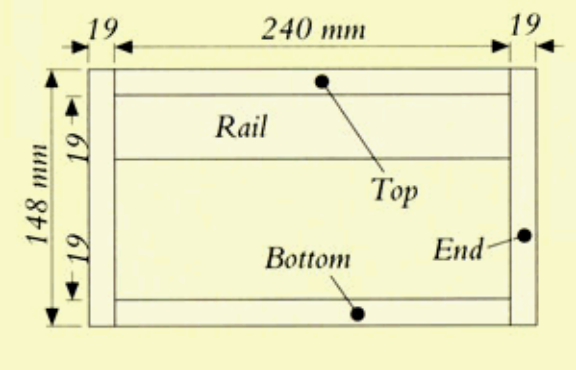
Here's how

Cutting out

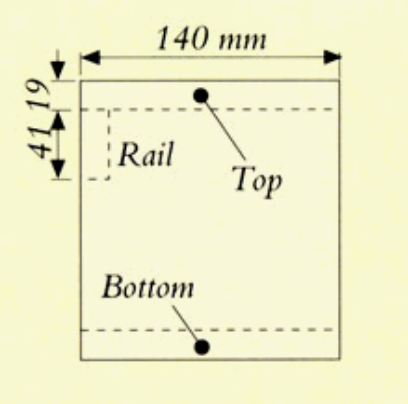
1. Mark out the required lengths on the timber (see diagrams below), leaving 5mm between each part for the saw cut and for cleaning back. Use the square to square the lines across the face and around all sides of the timber. Check that the lines are square and, when you're satisfied, retrace the lines using a utility knife to cut the top fibres. This reduces the breaking out of fibres on the underside of the cut and reduces the need for putty at a later stage.

2. Cut the components to length. If you are using a circular saw, use a straight timber batten to run your saw against to ensure a square cut.

3. Take the timber parts of the same size and hold them together in the vice. Ensure the marking knife lines are aligned. With a fine set on the plane, plane the ends down to the correct length. Plane towards the centre from each side of the parts so as to prevent the timber chipping. Check that you have planed each part to a peak in the centre and that you are planing square to the face of the material. Then work from the centre towards the outside edges to plane the peak down flat. Regularly check your parts for square. Repeat this step for each part of the job, including the fixing rail.



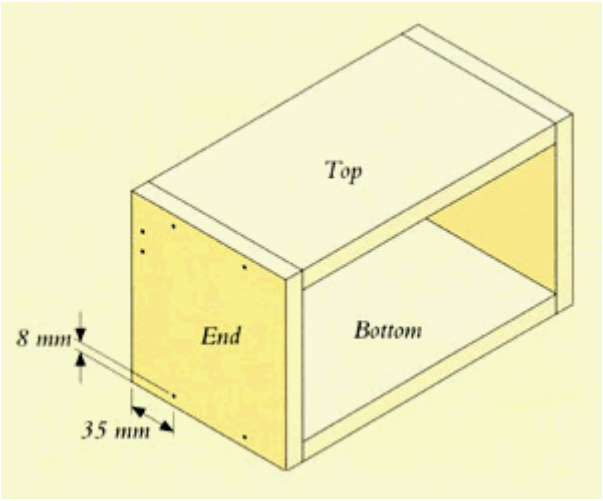
Front elevation.



End elevation

Assembly

4. Take the top and place it in the vice, end up. Take one end and determine the outside and front and top edges. On the outside, about 8mm down from the top edge and 35mm in from the front and back edges, start a 40mm nail off (see diagram below). Spread adhesive on the edge to be joined, use your finger to spread the adhesive and rub it in well. Apply a second thin coat of adhesive to the joint and bring the two parts together. Nail the joint together. Try to keep the face and edges flush.



Position for the nails

5. Following the same method, join the bottom to the end. Turn the box over and nail on the other end.

6. Insert the fixing rail and nail it home. Punch and putty nail heads.

Finishing and installation

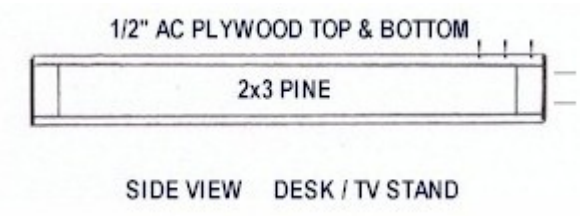
7. Finish the shelf as desired. If painting your shelf, use two coats of paint, sanding between each with 180 grit sandpaper. Use a primer first to choke the timber grain and make it easier to sand. If you intend to use stain or clear lacquer, remove all excess adhesive first or the stain will not penetrate through into the timber and there will be white blotches.

8. Decide where the shelf should be fixed. If you're fixing the shelf to a masonry wall, drill two 6.5mm holes in the fixing rail about 180mm apart and 30mm down from the top edge. Position the unit on the wall, using a spirit level to make sure it is horizontal, and mark the position for drilling on the wall. Use a 6.5mm masonry bit to drill the holes in the walls, place plastic star plugs in the holes and screw the unit into position. If your

walls are not solid masonry, use hollow wall anchors to fix the shelf in position, following the manufacturer's instructions and using a spirit level to be sure it is positioned horizontally.

WALL DESK AND TV SHELF

Step 1 - Prepare..... Hand select 2x3 or 2x4 construction grade lumber, looking for a few clean, straight and blemish free studs. If you use 2x4 studs...rip them down to 2x3 size (2 1/2"). The top is made from 1/2" A/C plywood. Determine width and length of your project to fit your needs.



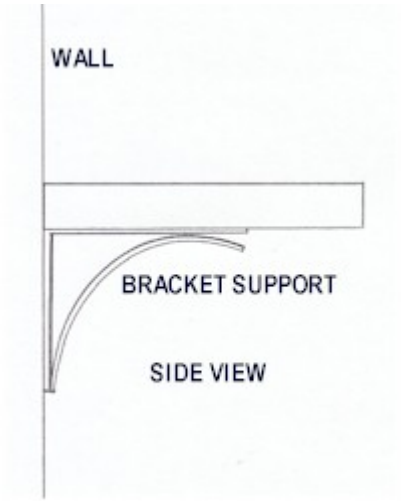
Step 2 - Cut 2 - 2x3 to length and 3 - 2x3 to the width needed to make the desk the size you desire. Nail or screw front 2x3 to side 2x3 as shown in above drawing. Nail or screw the 3rd 2x3 in the middle of this frame as a center support for the plywood top. Countersink the nails or screws and fill with wood dough.

Step 3 - Measure the outside dimensions of your frame and cut the plywood top and bottom to fit. Nail the top and bottom in place as shown. Countersink the nail heads and fill with wood dough.

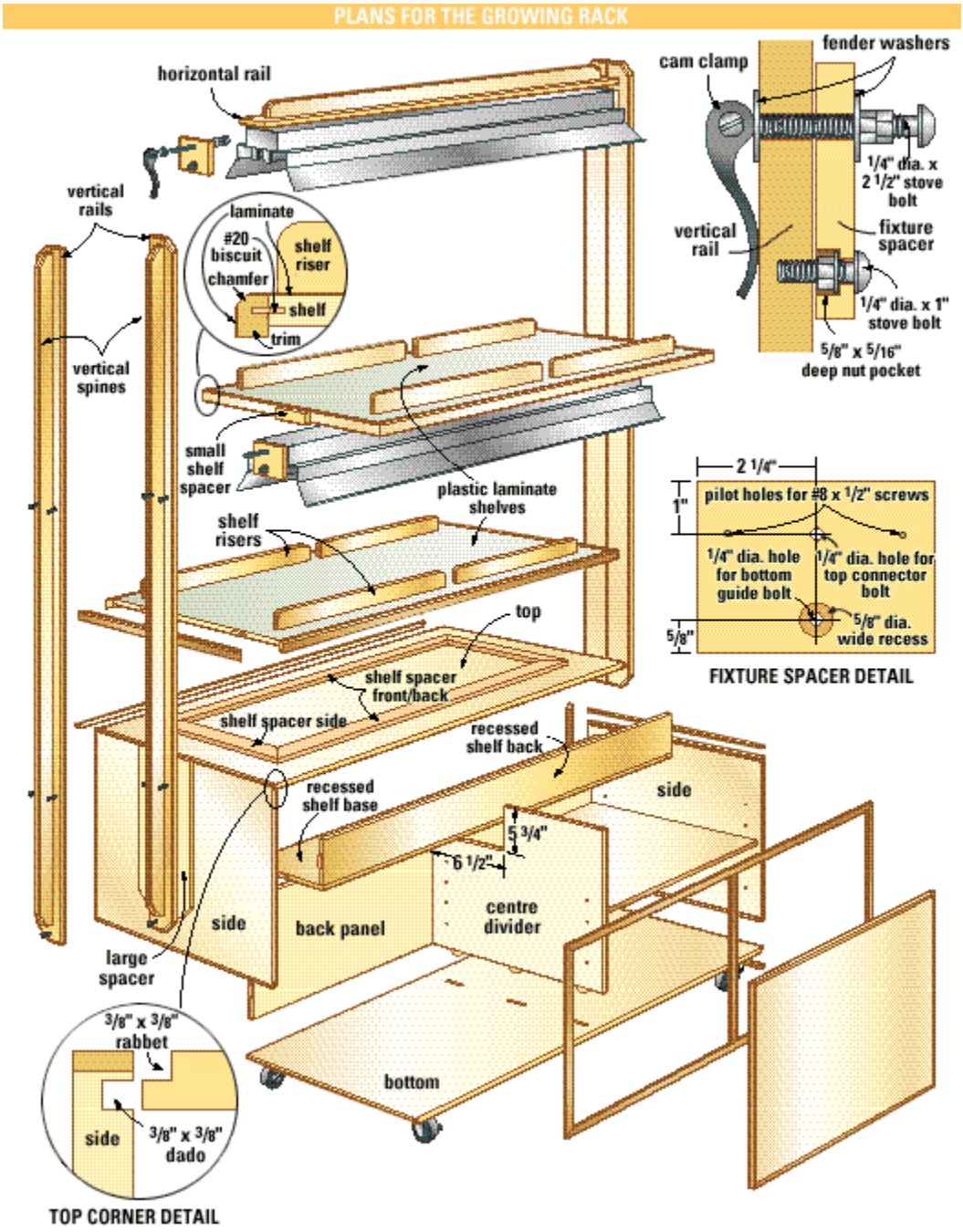
Step 4 - The finishing of this project will take a good deal of sanding. Use a belt sander and smooth the sides of the desk until the plywood and 2x3 panels are flush and smooth. Smooth the top and bottom edge of the plywood being careful to not sand through the top veneer of the plywood sheet. Fill all voids in the plywood with a hardening wood putty (Plastic Wood type) Sand and finish with stain or paint.

Project mounted from below with brackets.

Step 5 - Mount project on wall at desired location using support from above or below as shown in our two examples. Make sure your supports from above or below are at a measurement that hits the framing studs in the wall.



GROWING RACK



Make the Base Case

Begin by cutting panels for the sides, top and bottom. I used birch ply for these parts, but any 3/4"-thick sheet material will do. Next, cap the top and bottom edges of the side panels with 1/4"-thick strips of solid hardwood. The rest of the exposed plywood edges are capped later. Make the strips slightly wider than the thickness of your sheet material so the edges overhang the plywood, allowing it to be sanded flush later.

I used rabbet and dado grooves for the interlocking joinery that connect the corners of the box. First, cut the 3/8" x 3/8" rabbets on the ends of the top and bottom pieces, then cut the matching dado grooves in the side members.

Now is also the time to prepare plywood panels for the cabinet back, recessed shelf base, shelf back, and the centre divider. Although you're almost ready to assemble the box, first drill 5/16" dia. x 3/8" deep holes on the inside faces of the

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side panels and on both sides of the centre divider, to receive the adjustable-shelf-pin sleeves. Assemble the recessed shelf, then attach the shelf, back panel, and centre divider to the box using #20 biscuits. The plans show how it all fits together and where to plunge slots for the biscuit.

Dry-fit the base unit, then reassemble it with glue and clamps. Measure and equalize the diagonals to square the unit before you set it aside to dry.

Next, use a tablesaw to prepare plywood panels for the doors and adjustable shelves, then cover all exposed plywood edges on the base unit and the doors and shelves using the solid birch strips. The base unit rolls on lockable casters. Install these now.

I borrowed a couple of tricks from the kitchen-counter trade to make the two plant shelves for this project. Begin by preparing two 3/4" -thick plywood shelf panels and enough 3/4" x 1"-solid birch trim to wrap around the edges. Mark and cut the edging to fit with mitred corners, then fasten it to the ply using glue and #20 biscuits.

The high-pressure plastic laminate comes next. I used my tablesaw spinning a standard 80-tooth carbide-tipped combination blade to cut the laminate panels to size for the top and edges. To minimize chipping, make your cuts with the good side facing up and use a feather board or pushstick to keep the material pressed flat against the saw table. Cut all the laminate pieces you'll need for the shelf sides and tops, allowing about 1" of excess all around.

An electric timer saves effort and makes lighting more consistent, which is essential for optimum plant growth.

I prefer LePage's Pres-Tite Green Professional Quality contact cement for securing laminate. It cleans up with soap and water, and doesn't emit toxic fumes. Spread some on the back of the laminate and corresponding shelf faces before setting the parts aside to dry.

When the adhesive is no longer tacky, roll the laminate on to the substrate, keeping the edges aligned as you work. When you're done, apply pressure to the entire surface with a roller or the palm of your hand, working from the centre outwards, to consolidate the bond.

I used a hand-held router spinning a flush-trimming bit to remove the excess laminate from the top of the shelves. Next, I installed laminate on the shelf edges before using a 45* chamfering bit to reveal an angled face of solid wood around the perimeter.

The water-tight plastic plant trays are suspended from 13/4"-high risers attached to the top of the shelves. Make the risers from 3/4"-thick solid birch, then use the bandsaw to cut a decorative 5/8" -radius curve on the top corners. Sand, then install the risers using #8 x 2" screws, driven up through the underside of the shelves.

Light intensity is controlled by varying the lamp height. A well-adjusted cam clamp makes locking quick and simple.

I also added a spacer under the lower shelf to raise it up slightly from the top of the base unit. Cut the four sides of the spacer frame from 3/4" solid birch, then assemble the parts using #20 biscuits and glue to strengthen the mitred corners. When dry, centre the frame on the bottom of the shelf and secure it with #10 x 11/4" screws. Countersink the heads so they don't interfere with the shelf when installed.

Fasten the shelf to the top of the base unit with #8 x 13/4" screws driven up through the underside of the cabinet top. Don't use glue. The shelf needs to come off later for finishing.

Cut the rail and spine stock you'll need from 3/4"-thick hardwood. To make these parts more pleasing to the eye, trim the outside corners to a 45o angle and chamfer the edges to match the profile routed on the shelves. Just leave the guide slots square.

With this done, attached the spines to the corresponding rails using glue and #8 x 11/4" screws. Pre-drill for the screws and counterbore their heads so they can be covered with tapered plugs. Mitre the corners of the large spacers to a 45° angle to match the profile on the ends of the rails. The corners of the small spacers are rounded over with sandpaper.

Next, attach the large spacers to the ends of the base unit with glue and #8 x 1" screws. But before you install the rails, take time to cut temporary spacers to maintain a consistent slot gap while you work. The spacers should be a hair wider than 1/4", to allow the bolts that guide the fluorescent fixtures to travel freely in the slots as they slide up and down for adjustment.

Attach the upright assemblies using glue and #8 x 13/4" screws, with nickel-plated cup washers under the heads. As you install the upper shelf, it's a good idea to clamp a couple of temporary braces to the vertical rails. These will support the shelf while you work. With the shelf and small spacers in position between the rails, drill pilot holes for #8 x 2" screws. Next, remove the shelf and widen the pilot holes in the rails and spacers with a 3/16"-dia. bit. This prevents the narrow spacers from splitting as the screws are driven home. With the shelf back in position, install screws (with cup washers under the heads).

Let There Be Light

Home centres carry all sorts of 48" fluorescent light fixtures, but for this project the best choice is the type that comes prewired with a grounded electrical cord.

Before you begin, notice how a system of spacer blocks and bolts are added to the ends of the fixtures to make a connection with the vertical rails. Cut the spacer blocks from 1/2"-thick hardwood, then pair up each spacer with one of the fixture end plates. Take the time to mark the spacers and end plates to keep track of the pairings. The holes you will drill may not align if the pieces aren't returned to their original homes.

Locate the wooden risers to match your plastic seedling trays. The risers make it easier to pick up the trays when necessary.

Use a drill press to bore a 1/4"-dia. hole through the centre of each end plate and corresponding spacer to receive the bolt that connects the fixtures to the rail assemblies. While you're at it, switch to a smaller bit and drill pilot holes for the screws that secure the spacers to the end plates.

With holes drilled and bolts installed, secure the spacer blocks to the corresponding end plates with #8 x 1/2" pan-head screws, inserted through the pilot holds you drilled earlier. Reinstall the end plates on the fixtures.

At first it may appear that the 1/4" dia. x 21/2" bolts used to connect the fixtures to the rail assemblies are too long. Don't be fooled. Tighten a pair of 1/4"-dia. nuts together on the bolt, close to the head, to serve as adjustable spacers. The spacers are used to alter the thread length that protrudes through the rail slots for the cam clamps. These clamps won't work properly unless the bolts they thread onto are just the right length. Spin the nuts onto the bolts, then add a fender washer to each before inserting the bolts through the fixture ends.

Tilt the light assemblies into place between the rails and engage the bolts in the rail slots. Add a fender washer and cam clamp to the end of each bolt protruding through the rails. Check to make sure the lights slide up and down without binding, then lock them in place by engaging the cam clamps.

Finishing Up

Remove the light assemblies and plant shelves before sanding the entire project up to the 220-grit level. I like the look of natural birch, so I brushed on three coats of semi-gloss polyurethane, sanding with 600-grit paper between coats. Don't forget about the chamfered edges on the plant shelves while you're finishing.

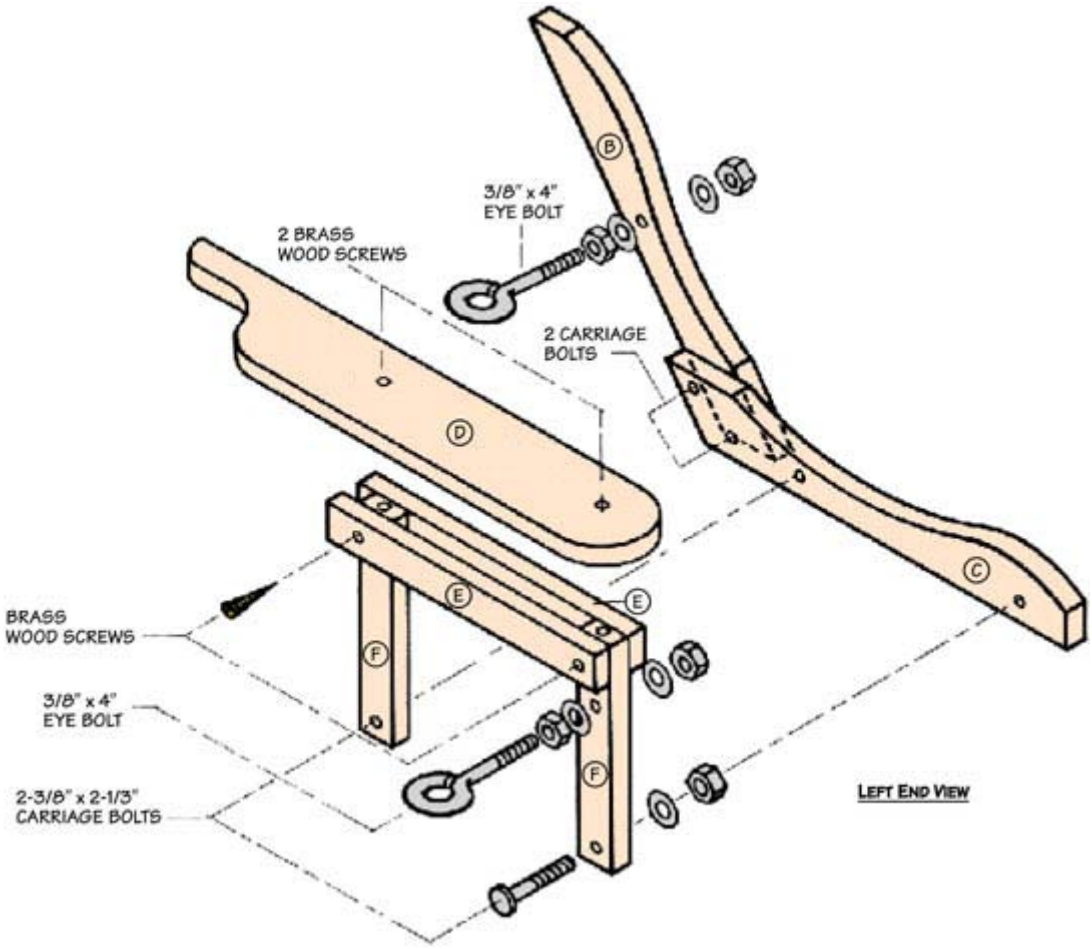
When everything's dry, reinstall the shelves and light assemblies with fluorescent tubes. Finish up by attaching the doors with piano hinge, then add the shelf pin sleeves, magnetic door catches, and door pulls.

Any basic electrical timer works fine for controlling the lights. For safety, use only a GFI-protected (ground fault interrupter) circuit to power this unit. Load up the base with supplies and tools and you're ready to get growing.

You will need:			
For the Base Unit	**Material**	**Size**	**Quantity**
Top and bottom	birch ply	3/4" x 20 3/4" x 47 1/4"	2
Sides	birch ply	3/4" x 19 1/2" x 20 3/4"	2
Centre divider	birch ply	3/4" x 18 1/2" x 20"	1
Recessed shelf base	birch ply	3/4" x 6 1/2" x 46 1/2"	1
Recessed shelf back	birch ply	3/4" x 5" x 46 1/2"	1
Back panel	birch ply	3/4" x 12 3/4" x 46 1/2"	1
Doors	birch ply	3/4" x 19 1/2" x 23 1/2"	2
Adjustable shelves	birch ply	3/4" x 19 3/4" x 22 1/4"	2
Edging	hardwood	1/4" x 3/4" x 70' *	1
For the Supports and Braces			
Vertical rails	hardwood	3/4" x 2 1/2" x 66"	4
Vertical spines	hardwood	3/4" x 1" x 63"	4
Horizontal rail	hardwood	3/4" x 3" x 49"	1
Horizontal spine	hardwood	3/4" x 1" x 47"	1
Large spacers	hardwood	1/2" x 4 1/2" x 15"	2
Small spacers	hardwood	1/2" x 3/4" x 4 1/2"	2
Fixture spacers	hardwood	1/2" x 3 1/4" x 4 1/2"	4
For the Fixed Shelves			
Shelf panels	birch ply	3/4" x 20 1/2" x 46 1/2"	2
Edging	hardwood	3/4" x 1" x 25'*	1
Shelf surface	plastic laminate	24" x 48"	3
Shelf risers	hardwood	3/4" x 1 3/4" x 22"	8
Shelf spacer sides	hardwood	3/4" x 3" x 19"	2
Shelf spacer front and back	hardwood	3/4" x 3" x 45"	2
Accessories and Hardware			
Fluorescent fixtures		48"-long	2
Timer			1
Power Bar			1
Plant trays		LV#PK404	4
Door pull	trowel	LV#01W94.08	1
Door Pull	fork	LV#01W94.07	1
Magnetic catches			2
Casters		3" dia.	4
Bolts		1/4" dia. x 1"	4
Bolts		1/4" dia. x 2 1/2"	4
Nuts		1/4" dia.	12
Fender washers		1/4" dia.	8
Cam clamps		LV#05J51.01	4

Shelf pin sleeves			24
Shelf pins			8
Cup washers	nickel plated	for #8 screws	24
Piano hinges		3/4"-wide x 20"	2
Piano hinge screws		#5 x 1/2"-long	approx. 100
Flathead screws		#8 x 2"	36
		#8 x 1"	18
		#8 x 1 3/4"	22
		#8 x 1 1/4"	40
Pan head screws		#8 x 1/2"	8
		#8 x 3/4"	16
*total length required			

PORCH SWING



List of Materials

(finished dimensions in inches)

A	Slats (21)	3/8 x 1-1/2 x 52
B	Back Supports (3)	7/8 x 2-1/2 x 19-1/4
C	Bottom Supports (3)	7/8 x 2-1/2 x 19-1/4
D	Arm Rests (2)	3/4 x 4 x 23-1/2
E	Arm Braces (4)	3/4 x 1-1/2 x 13
F	Arm Posts (4)	7/8 x 1-1/2 x 9-1/2

Hardware

(all dimensions in inches)

Eye Bolts (2) – Heavy Gauge	3/8 x 4
Carriage Bolts (10)	3/8 x 2-1/2
Washers (14) – To fit Carriage Bolts	3/8
Nuts (14) – To fit Carriage Bolts	3/8
Brass Wood Screws (68)	#8 x 1-1/4
Brass Wood Screws (6)	#8 x 1
Heavy-Gauge Chain	25 feet

STEP 1:

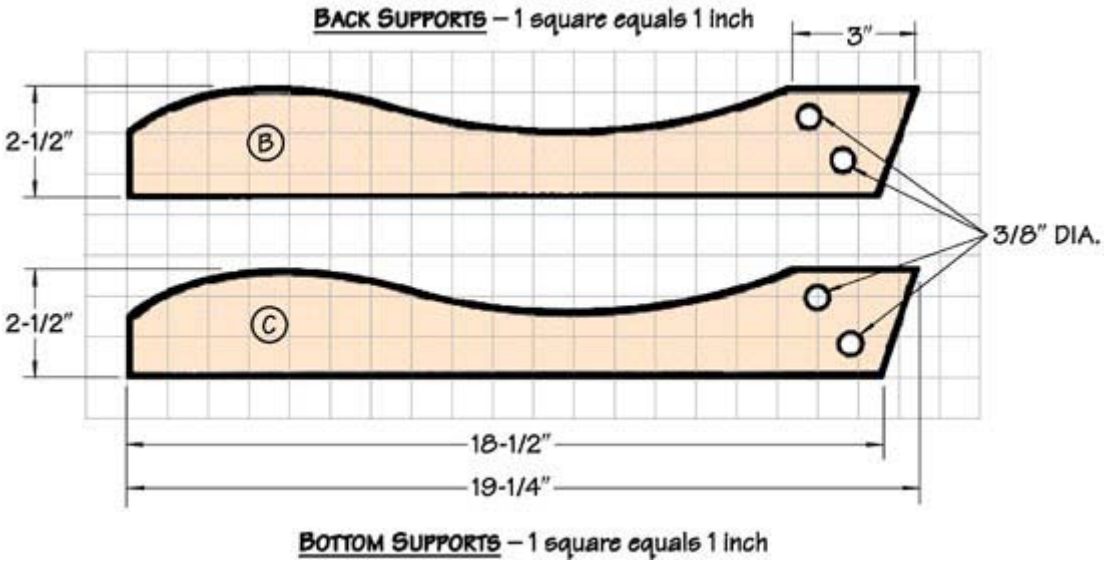
Plane your stock for the three back supports (B), three bottom supports (C) and 21 slats (A) to the desired thickness. Our guidelines call for 7/8-inch, 7/8-inch and 5/8-inch, respectively. Remember, you may choose to make these parts thicker if you are lengthening the swing or using lumber that may not be as strong as oak.

STEP 2:

Cut the back supports (B), bottom supports (C) and slats (A) to size/length, according to the List of Materials.

STEP 3:

Using your bandsaw or scroll saw, cut out the contours for the back and bottom supports (B & C). For best results, use the pad sawing technique with double-faced tape to cut multiples of the same profile at the same time.



STEP 4:

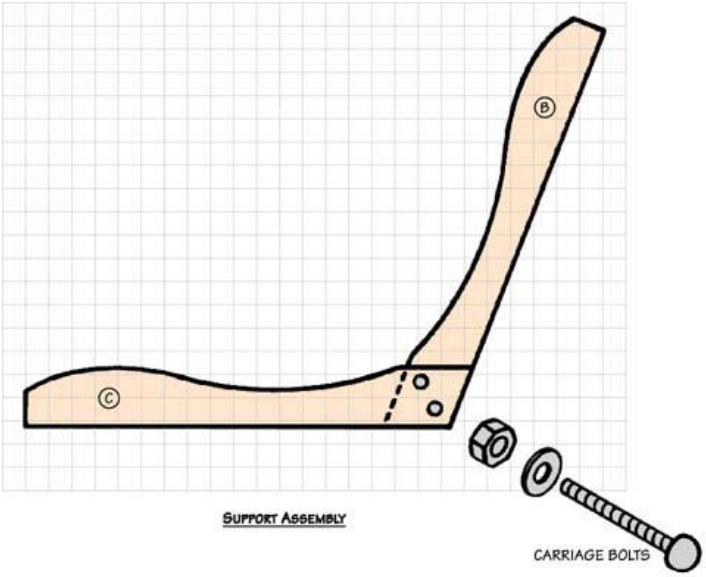
Using your drum sander, sand all the support profiles (B & C) while they're still taped together.

STEP 5:

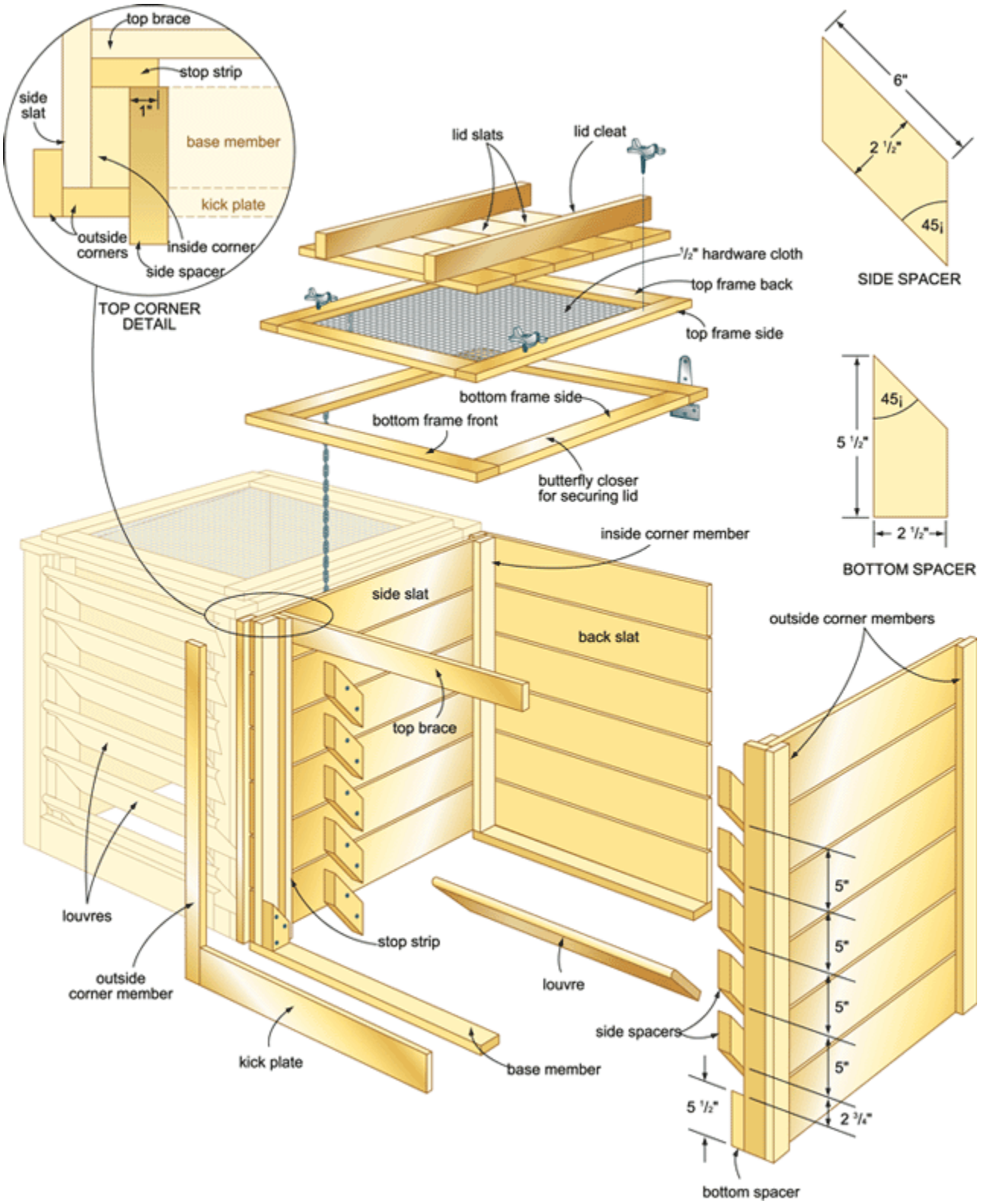
Again . . . while they're still taped together . . . drill 3/8-inch diameter holes at the locations indicated in the support pattern.

STEP 6:

Untape the back and bottom supports (B & C) and assemble them with carriage bolts, washers and nuts. Tighten securely (see Support Assembly).



GARDEN COMPOST BIN



Start building the box by cutting 18 side and back slats, and four spruce inside corner members. Next, place two corners on your workbench, 34" apart, with their 2 1/2" faces down. Now attach six side slats to these parts, ends flush with the outer edges of the corner members and a 1/2" space between each slat. Fasten the slats and corners with one screw per joint initially, then square the frame by equalizing diagonal measurements taken corner to corner before adding two more screws per joint to lock the assembly firm. Build the opposite side frame exactly the same, then stand both upright, 34" apart, and join them with the remaining six slats to produce a three-sided, free-standing box.

Next, prepare the six outside corner members and add one to each back corner of the box, flush with the back face as shown on the plans. Attach two more outside corners to the front face of sides, and the final two on the outside faces of the sides. As

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you'll discover, the outside corner members add considerable strength to the unit, and cover the exposed ends of the slats, for a neater, trimmed look.

Cut the two stop strips to size and attach them to the backside of the front inside corners. The plans show how these strips overlap the inside corners by 1" along their length and prevent the removable louvres from dropping into the composter.

Louvres help aerate your compost pile, and because they're removable, you can take a few out to reach finished compost at the bottom, or take them all out and turn the whole pile over.

At this point, you have the basics of a three-sided box. Now it's time for some detailing. From your supply of 2 x 3s, cut the ten side spacers and two bottom spacers to shape, with 45° cuts, as shown in the plans. These are screwed to the inside surface of the front inside corners, to hold the removable louvres.

Begin spacer installation by screwing the bottom pair flush with the bottom ends of the front inside corners. Then, working your way upward, apply five spacers per side as shown. This leaves about 1 1/16" between each spacer for the louvres to slide 45° down to the vertical stop strip you added earlier.

The kickplate and top brace bind the three sides of the compost box together to hold the load it will contain during use. Cut these parts now and screw them in place as shown on the plans. Cut and install the base members while you're at it. These are designed to snuggle into the ground, boosting stability. Cut the removable baffles next, slide them home, and the body of your composter is done.

You Will Need

For the Body	Material	Size	Qty.
Side and back slats	cedar	1" x 5 1/2" x 34"	18
Inside corner members	spruce	1 1/2" x 2 1/2" x 35 1/2"	4
Outside corner members	cedar	1" x 2 1/2" x 35 1/2"	6
Stop strips	cedar	1" x 2 1/2" x 35 1/2"	2
Bottom spacers	spruce	1 1/2" x 2 1/2" x 5 1/2"	2
Side spacers	spruce	1 1/2" x 2 1/2" x 8 1/2"	10
Kickplate	cedar	1" x 5" x 29"	1
Top brace	cedar	1" x 4" x 32"	1
Base members	spruce	1" x 2 1/2" x 34"	2
Baffles	cedar	1" x 5 1/2" x 28 7/8"	6
For the Lid			
Bottom frame front & back	cedar	1" x 5" x 38"	2
Bottom frame sides	cedar	1" x 5" x 26 1/2"	2
Top frame sides	cedar	1" x 4" x 35 1/2"	2
Top frame front & back	cedar	1" x 4" x 29"	2
Lid slats	cedar	1" x 5 1/4" x 28 7/8"	5
Lid cleats	cedar	1" x 1 3/4" x 29 1/2"	2

Hardware

approx. 250 #8 x 2 1/2" deck screws; approx. 40 #7 x 2" deck screws; one 32" x 32" hardware cloth; a 3ft. chain and two eye-bolts; a pair of 5" strap hinges; onehandle and 4 butterfly closers

The composter lid has two parts: an outer, screened double frame and an inner lid that sits within it. Start by joining the top and bottom members together into two frames using weatherproof glue and biscuits or dowels. Next, stretch and staple the hardware cloth to the top surface of bottom frame. Place the smaller frame on top, then clamp the assembly together before joining the two frames with 2" screws driven from underneath.

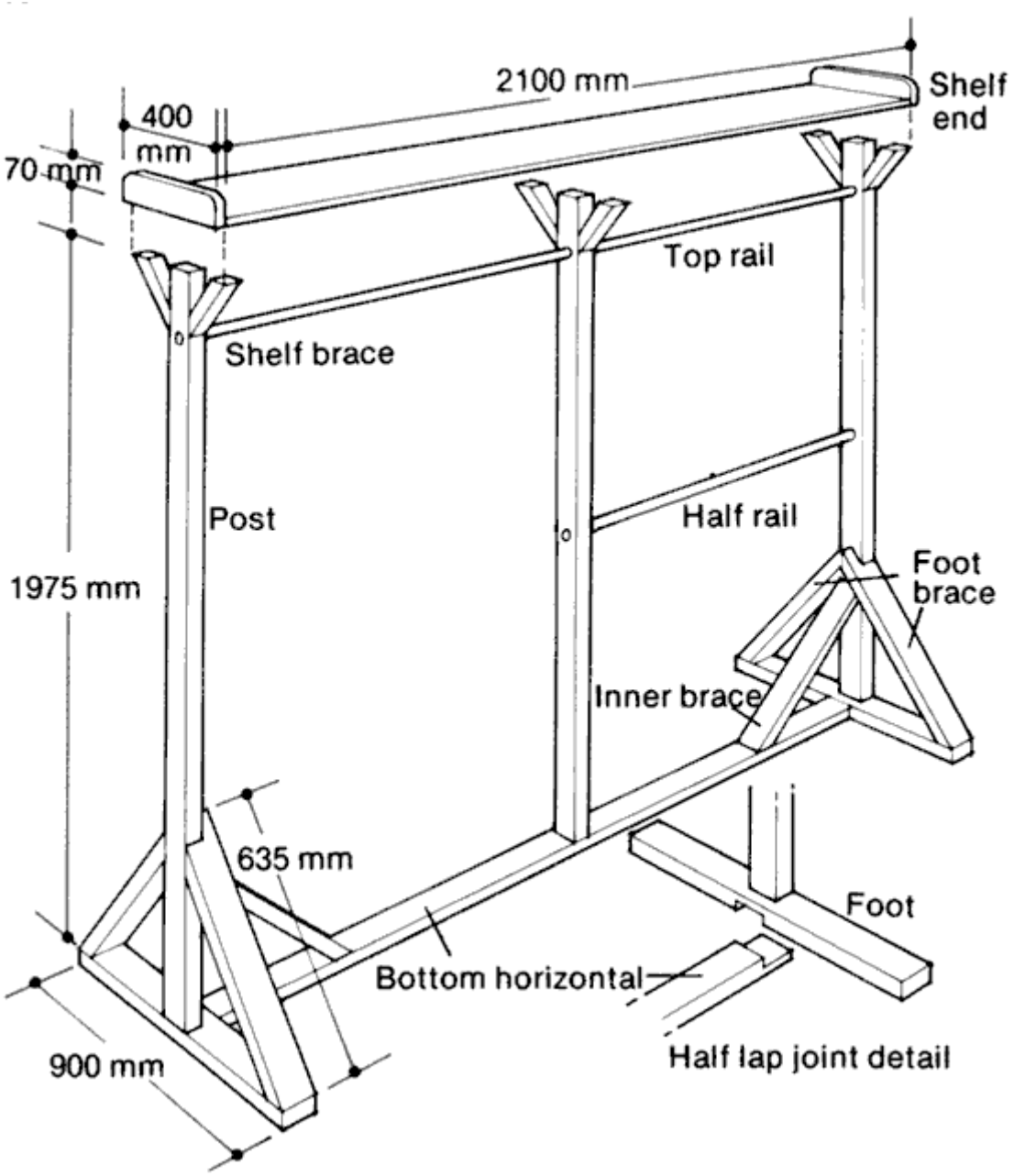
The removable portion of the lid is simply five pieces of wood laid edge to edge and joined into one unit with two top cleats screwed 2" from the lid slat ends. Attach four butterfly closers to the top of the frame to hold the lid in place, a chain to stop the lid from flopping back too far when open, and hinges.

Occasionally you'll want to remove the lid to screen finished compost into a wheelbarrow or a bucket. Remove the hinge pin by grinding off one end and replace it with a large spring pin—a kind of removable cotter pin you can get at hardware stores. Now when you want to move the screen, just pull the pins out.

Once you've screened out any pieces that haven't composted completely, you'll have struck gold—pure, black, garden gold.

Strong corner construction is essential for durability. Your composter has to withstand the forces of weather from the outside and the strain of a heavy pile of hot, rotting compost on the inside.

CLOTHES RACK



Part	Material	Length in mm
post (3)	70 x 37mm pine	1975
bottom horizontal (1)	70 x 37mm pine	2100
feet (2)	70 x 37mm pine	900
feet braces (4)	70 x 37mm pine	635
inner braces (2)	70 x 37mm pine	625
shelf (1)	19mm edged particleboard	2100 x 400
shelf ends (2)	70 x 19mm pine	400
top rail (1)	25mm dowel	2063
half rail	25mm dowel	1031

You'll also need: 40mm and 60mm countersunk screws; wood filler.

Tools
Basic carpentry kit including a drill and mitre box.

Here's how:
1 Start by joining the feet to the bottom horizontal using half-lap joints. Drill and screw through the joints and into the bottom of the posts, using two screws for each joint.

2 To fit the leg braces, cut 45 degree angles at either end and saw out a 37mm x 35mm section at the top end to enable them to fit around the post and the foot. Mitre the ends of the inner braces and screw in place. Screw the central post in place through the bottom of the horizontal.

Right foot and brace, see diagram above.

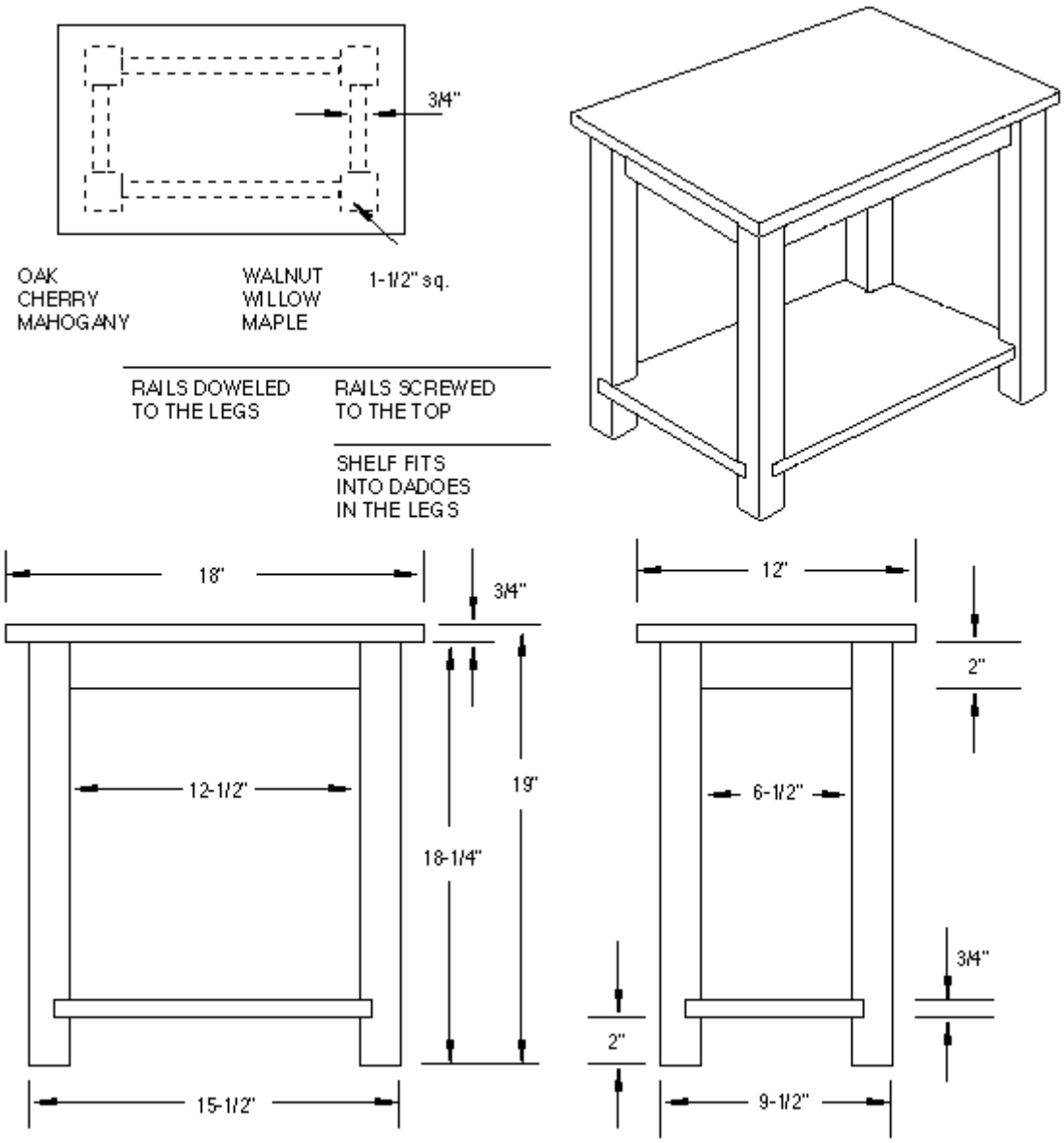
3 Glue and screw shelf ends in to the shelf. Screw through the shelf into the top of the end posts, remembering to face the finished timber edge of the shelf to the front.

4 Drill holes in the posts to take dowel rails. Position the top dowel 150mm below the shelf and half rail 900mm up from the floor. Drill holes slightly larger than the dowels, noting that you should drill only halfway in tot he outer posts to accommodate the ends of the dowels. Drill and screw into the dowel ends through the posts.

5 Fit and screw the shelf braces in place and fill and sand all screw holes. Paint if required.

Right upper shelf and brace, see diagram above.

BEDSIDE TABLE



Procedure

I. Top and Shelf

1. Lay out rough dimensions of all parts on wood.
2. Cut pieces to rough dimension lengths.
3. Joint one edge of each piece.
4. Cut and glue pieces edge to edge to make the top. (Glue oversize.)
5. Cut and glue pieces edge to edge to make the shelf. (Glue oversize.)
6. Let glue cure overnight.
7. Plane to 3/4" thick. * If you started with 3/4" stock, keep it as thick as possible.
8. Cut to finished size on the table saw.
9. Sand smooth.

10. Rout the top edge of the top with whatever edge-forming bit you like. * DO NOT ROUT THE SHELF!

11. On the shelf only, cut a 3/4" X 3/4" square off each corner to fit into the legs.

II. Legs

1. Face-glue two 3/4" thick by 1 1/2" wide leg pieces to make four leg blanks 1-1/2" X 1-1/2" X 20". Use straight finished wood.

2. Using the router table, rout a 3/8" roundover on each edge.

3. Square cut one end of each leg on the miter box.

4. Measuring from the squared end, mark and cut the other end of each leg to 18-3/4".

5. Sand smooth.

III. Rails

1. Cut rails to 2" wide.* You may wish to cut slightly oversized and joint to 2". Machine the two short rails together as one piece and cut into two short lengths after all machining is done. * Make sure to use proper push blocks and safety procedure for the jointer.

2. Cut one end of each rail square on the miter box or table saw.

3. Measuring from the squared end, mark and cut two long rails at 12-1/2" and one extra long rail into two short rails at 6-1/2".

4. Drill a 3/8" hole 1" into the edge of each rail. Then drill a 9/64" pilot hole the rest of the way through. (The holes will be used to attach the top to the table.) * The hole should be approximately centered on each piece.

5. Elongate the hole on the upper side by coming in from the top with a drill and carefully wiggling the drill around to end up with a tapered hole. This will allow for a little movement in the table. Wood shrinks and expands with changes in temperature and humidity, and without an allowance for movement, the table could crack at some point in time.

IV. Assembly

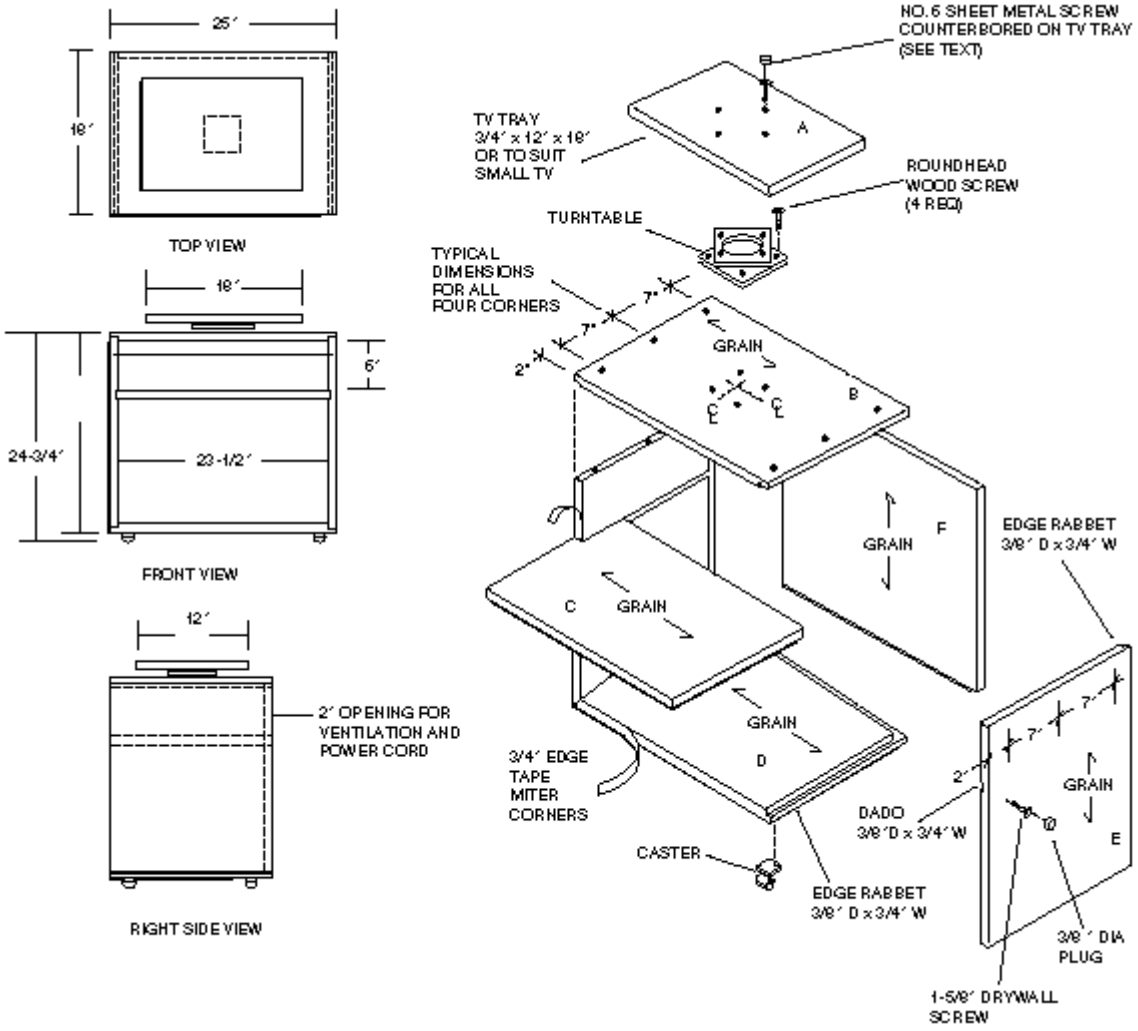
1. Take the four legs and cut a 3/4" dado 3/4" deep in two adjacent edges approximately 2" in from one end. * These dadoes support the shelf.

2. Finish sand all pieces.

3. Use either dowels or biscuits to attach the rails to the legs.* You must insert the shelf before you glue the rails to the legs.

4. Attach the top using four #6 X 1-5/8" drywall screws. * The screws slide through the holes that you drilled in your rails.

TV/DVD CABINET



Builder's Tip: When building quality furniture, remember all wood grains should "run" in a certain direction. For this project: sides and back - vertical; top and bottom - left to right.

1. After checking direction of wood grain, rough cut all members (slightly oversized). Note: The easiest way to work a large sheet of plywood initially is by placing it on top of three lengths of 2x3s laid across a pair of sawhorses. This improvised "table" puts the material at a convenient height.

2. Using a securely-clamped 4-ft. T-square as the straightedge, carefully trim the top, shelf, bottom and side pieces to size. Note: Back and tray piece will be trimmed later.

   Builder's Tip: Whether you use a table, radial arm, or portable circular saw, a fine tooth, plywood veneer blade should be installed to ensure perfectly clean cuts. Always cut wood with the veneer side down when using a portable circular saw, and with the veneer side up when cutting with table and radial arm saws.

3. Mark locations for ploughing all dadoes and rabbets on sides, top and bottom pieces.

   Builder's Tip: No edge rabbet is required at back edge of the top piece to accommodate the back piece because the back is installed with a 2" space between its top edge and the cabinet top. This space ensures ventilation for the VCR, plus easy ingress/egress for the cords.

4. Plough grooves and rabbets using a 3/4" straight bit in the router guided by a securely-clamped straightedge. If necessary, set up dado heads in the table saw to make these cuts.

   Builder's Tip: Cut edge rabbets for bottom piece in veneer side of plywood, so "good" side will face up into the cabinet. All other rabbets should be cut into the non-veneer or "lesser" side of the plywood panels.

II. Cabinet Assembly

1. Temporarily assemble cabinet by tack-nailing parts together with partially driven 1-1/4" finishing nails; if necessary, use several bar clamps as well. Note: Try to position nails where 1-5/8" drywall screws will eventually be driven, so nail holes will not be visible in veneer.

2. With piece assembled, bore screw holes using a counterbore bit, which makes the pilot, shank, countersink and counterbore holes in one step. Note: Drive home several strategically-placed screws to secure the piece until all the holes are bored.

3. With piece assembled, measure and trim back piece to size; temporarily install with veneer side out.

4. Lightly sand cabinet using 150-grit paper in the pad sander; always use with-the-grain strokes. Thoroughly dust all surfaces and disassemble.

5. Reassemble cabinet using carpenter's glue and 1-5/8" drywall screws. Immediately install back piece to ensure that cabinet remains square during glue drying period. Note: Since you may want access to cabinet from the back in the future, install back using screws only - no glue.

6. Use flexible veneer tape to cover exposed plywood edges:

    a. Cut tape slightly overlength for each edge.

    b. Work one edge at a time; apply contact cement to back of tape and mating surface, allowing adhesive to dry until it can be touched with a piece of clean brown paper without sticking.

    c. Carefully position first end of tape and guide along edge. Trim off any overlap.

    d. Allow entire assembly to rest for at least four hours.

III. TV Tray

1. Trim TV tray to size.

2. Install turntable (swivel) hardware. Note: Select and install turntable hardware that will accommodate the size and weight of the television it will support.

    a. Center "blind" side of turntable on tray's underside and mark screw holes.

    b. Remove turntable and bore holes for four No. 6 (1" long) self-tapping screws. On top side of tray, bore countersink holes (about 1/4" deep) using drill and countersink bit, so screw heads will be slightly below the wood surface when turned home.

    c. To make certain that self-tapping screws are correct length and won't interfere with turntable operation, temporarily attach the tray to the turntable by driving at least two of the screws into the turntable's small holes.

    d. Remove turntable from tray.

    e. Center turntable on top of cabinet; "blind" side up, mark and bore pilot screw holes for bottom plate.

    f. Lubricate turntable's ball bearings with a light to heavy oil, depending on the degree of rotating action wanted.

    g. Mount turntable on cabinet using four 1" No. 8 roundhead wood screws.

    h. Place the tray on the turntable using 6d finishing nails as guide pins to position the pre-drilled holes over the small turntable holes. Remove nails one at a time and drive home four self-tapping screws.

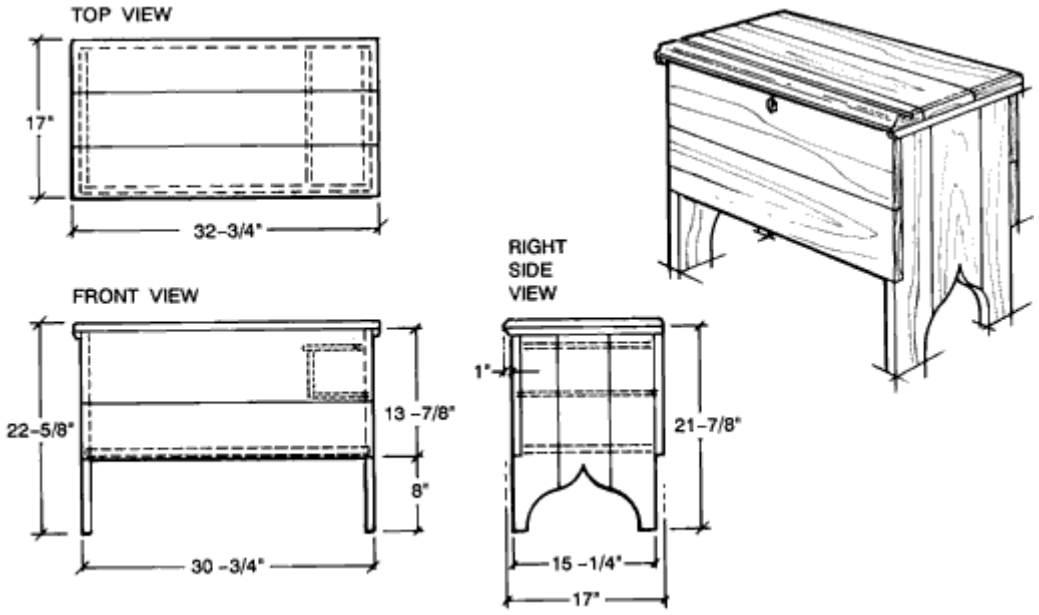
3. Cut the required number of 1/4" long dowel plugs from a length of 3/8" dowel to conceal screws holding cabinet together. To keep sanding on veneer surface to a minimum, do not cut plugs too long. Squirt glue into each hole and press plugs into place. Immediately remove excess glue from surface with clean, damp rag. Allow glue to dry overnight if possible.

4. Position plate casters on underside of bottom piece; mark for screws and bore pilot holes.

5. Fasten casters to cabinet bottom using screws that come with the hardware.

6. Inspect cabinet inside and out for smoothness. Sand lightly where necessary and wipe clean.

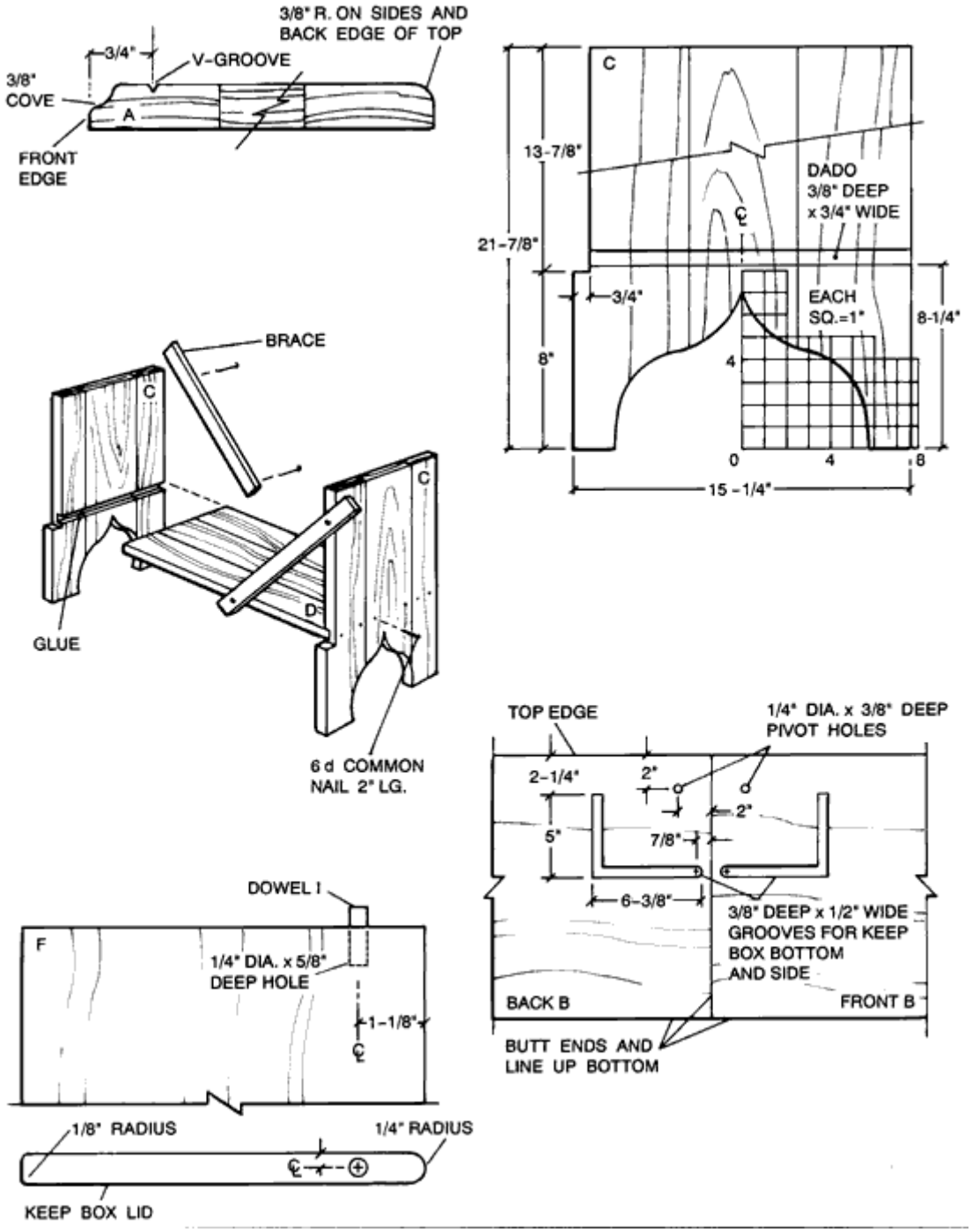
PINE BLANKET CHEST



Steps for building the Pine Blanket Chest:

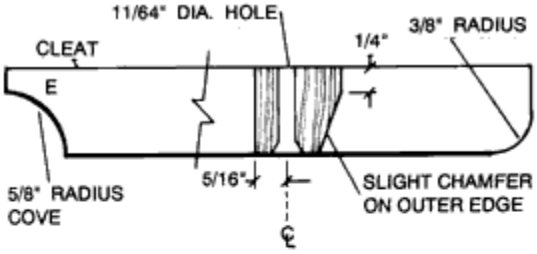
1. Cut all parts to size (see the cutting list); note that Parts A, B, C and D are initially cut slightly over-length to make edge-joining easier. Using glue and no. 20 biscuits, join the boards to make up six members (front, back, ends, bottom and top): use bar clamps to keep all sections tightly joined while the glue dries. The next day, these parts can be cut to their actual sizes, as shown in the drawing.
2. Shape the front edge of top A with a cove cutter chucked in the router. Then, replace the cove cutter with a V-groove cutter to rout the shallow V-cut along the front edge as shown. Finally, switch to a 3/8-in. rounding-over bit to shape the ends and back edges of top, A.
3. Lay out the leg shape on 1/4-in. plywood or hardboard and cut it out. Sand the cut edges smooth to remove any irregularities left by the saw blade. Set the pattern aside for use in Step 5.
4. Position the end panels back-edge to back-edge with inside surfaces up. With a framing square, check across leg bottoms to make certain they are perfectly aligned. When they are, apply light pressure with a bar clamp to hold them in place. Then, lay out the location of the dado, which will receive the bottom member, on the interior surfaces. After determining the router shoe offset (i.e.; the distance from cutter edge to shoe edge) with the 3/4-in. straight cutter in its chuck, clamp or tack a straightedge to serve as a guide for ploughing the dado across both boards at one time.
5. Next, tack the two end pieces together, with inside surfaces (the planes with dadoes) abutting. Trace the leg pattern onto the top member. Cut out the notch at front using a band saw or handsaws (rip and crosscut). Then, cut out the leg shape using either a saber or scroll saw.
6. After all chest parts have been cut to shape and size, plane the surfaces to remove any squeezeout where boards are joined. Smooth all boards beginning with 100-grit sandpaper and finish with 120-grit.
7. Cut the parts for the Keep Box to size.
8. Then, position the chest front and back members edge-to-edge (i.e.; the front's right edge should abut the back member's left edge, with their top edges aligned) so the grooves to receive the Keep Box front and bottom panels can be laid out. Rout grooves 3/8-in. deep using a 1/2-in. straight cutter; make certain you also use tacked-on guides to prevent the router from "walking off" the cutting line when you rout. At this time, also lay out and bore the blind holes, which will receive the lid's dowel hinges.
9. Round over the front edge of the Keep Box lid and bore the dowel holes. Glue-in the dowel "hinges."
10. Final pre-assembly step; shape the cleats as shown, bore the screw pilot and countersink holes and attach cleats to the underside of the top using glue and wood screws, as shown.

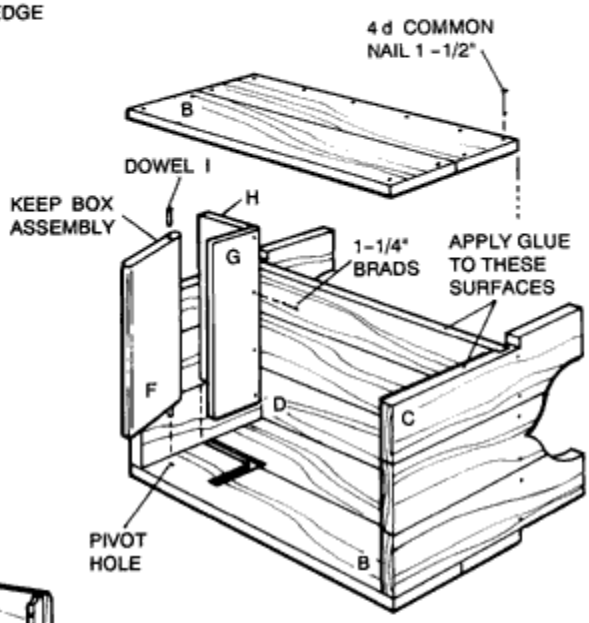
Cabinetmaker's Tip: Notice the shape (cross-section view) of these cleats. You will find it easier to obtain this shape if you chamfer cleats before installing them on the top.

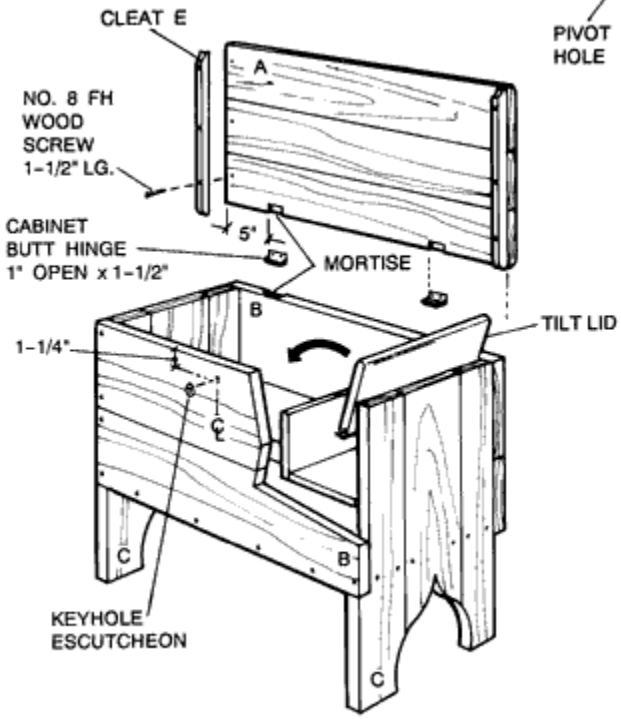


Assembling the Pine Chest

11. Fasten the back to the chest bottom and legs using glue and 1-1/2 in. common nails. (Nail heads should be set slightly below the surface after the cabinet is fully assembled.)
12. Lay the carcass on its back and install the Keep Box bottom and front into the slots in the carcass back, without glue. If necessary, apply clamp pressure to ensure that these parts are fully seated in their slots. Nail Keep Box front to bottom front using 1-1/4 in. brads.
13. Apply glue to front edges of chest legs and bottom and install front with Keep Box parts positioned in the slots in front member and the lid dowel hinge placed in its respective hole. When all is in place, fasten front to carcass with glue and nails.
14. Stand the chest upright and put the top in place. Then, mark and cut the hinge mortises in both top and back members.
15. Locate the position for the false keyhole at front; bore a small hole, about 1/4-in. deep. Paint the hole interior black or, use a permanent black ink marker.
16. Install hinges and the keyhole escutcheon plate so you can make certain that carcass and top align. Make any necessary adjustments if they do not. When satisfied with the fit, remove the hardware so you can move on to the next step--finishing.







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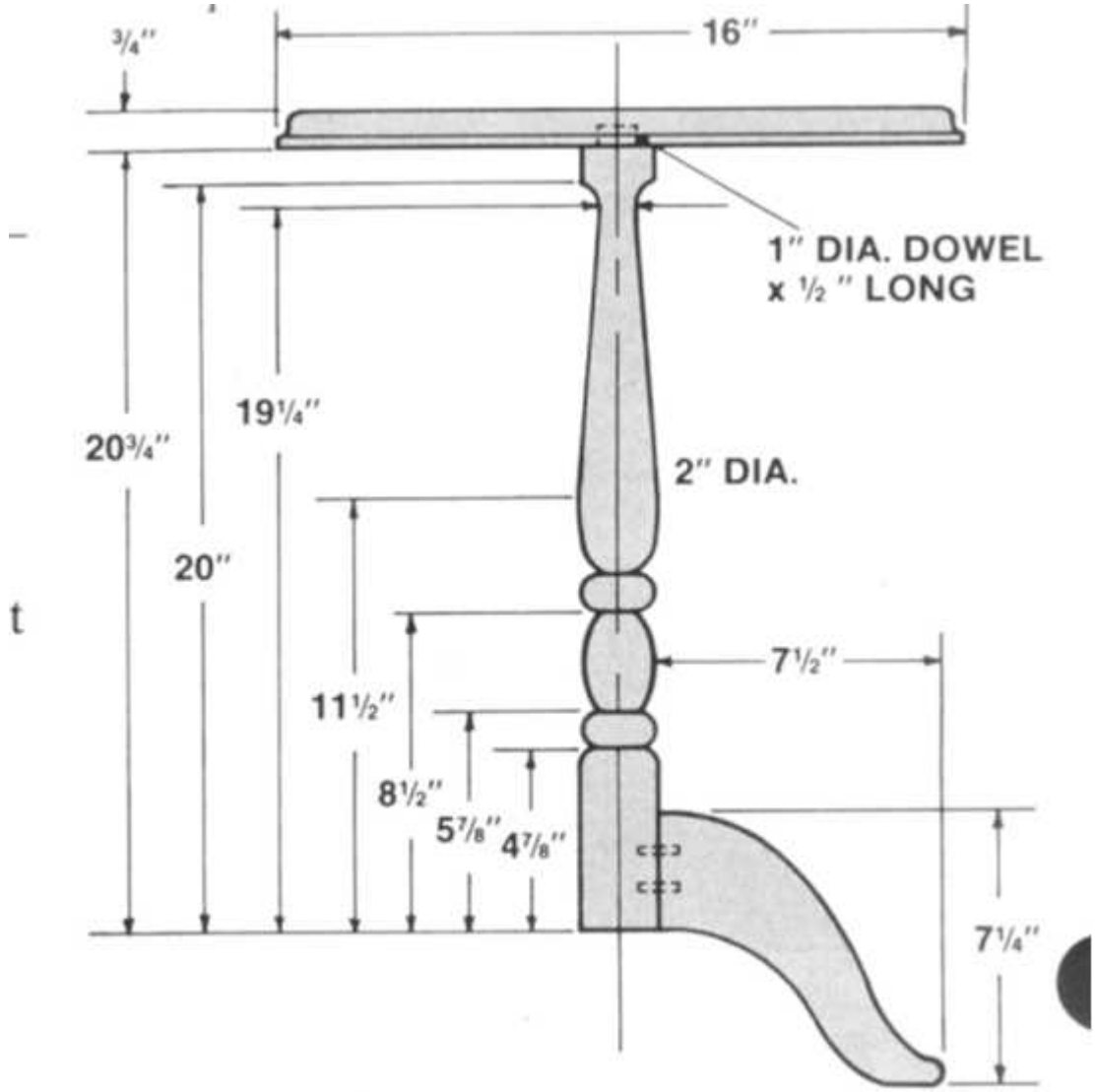
CONCORD TABLE



LIST OF MATERIALS

Finished dimensions in inches

A. Spindle 2 dia. x 21 1/4 stock

B. Top 3/4 x 16 dia. Stock

C. Leg (3) 3/4 x 7 1/4 x 7 1/2

D. Dowels (10) 3/8 dia. X 1 1/2 (hardwood)

E. Top Brace 3/4 x 3 x 12

1. Cut stock to size according to List of Materials. Layout the spindle pattern (A) on a piece of 1/4" thick stock.
2. Use a scroll saw, Bandsaw or jigsaw to cut out the pattern and sand all sawn edges smooth. You now have the template for the lathe duplicator.
3. Mount the template on the lathe duplicator per your Owner's Manual.
4. Turn part A from a piece of 2" diameter x 21 1/4" stock.

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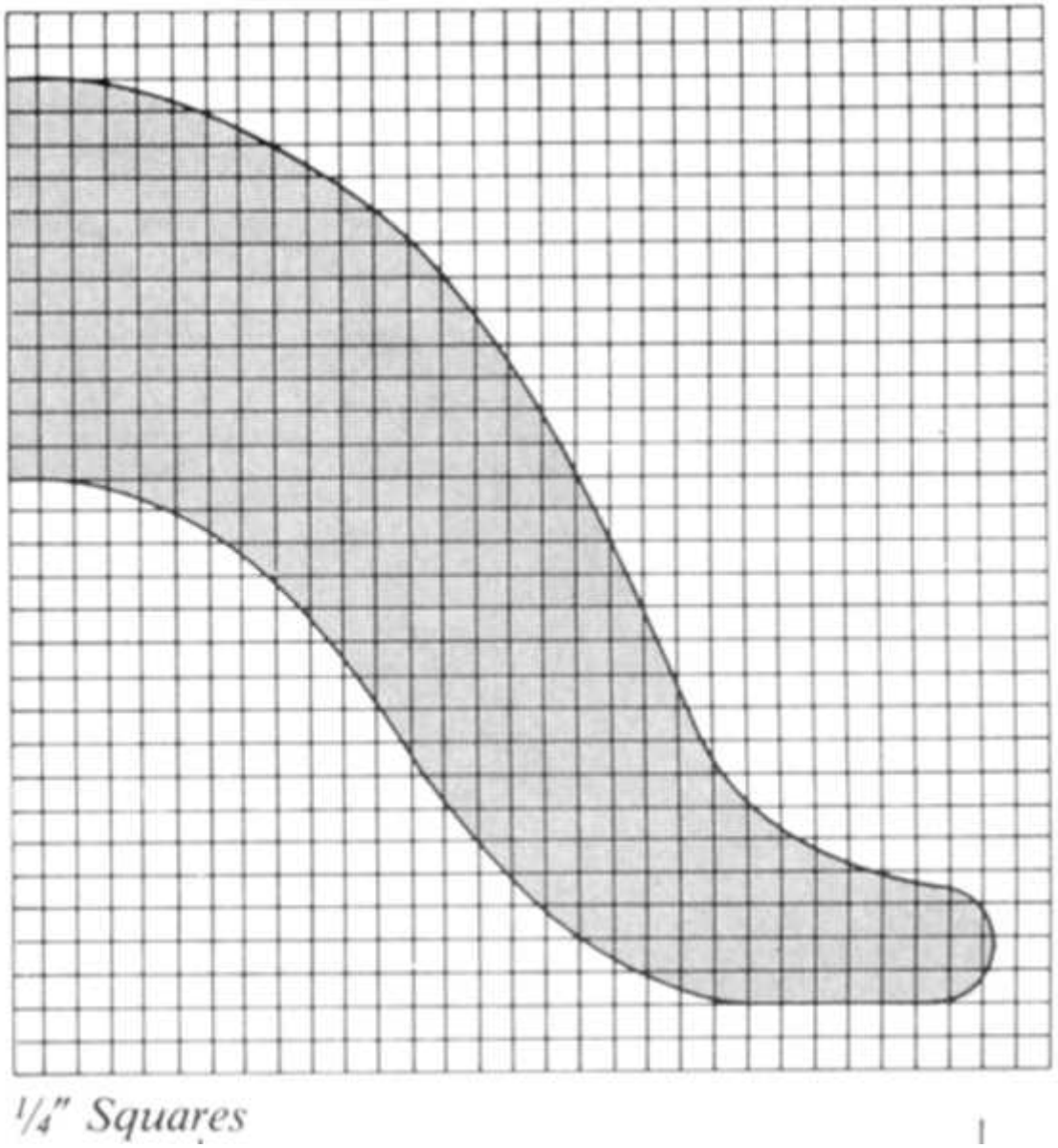
5. Sand the spindle.
6. With the Mark V in the horizontal boring mode, drill the 3/8" diameter holes for the dowels "D" in the legs "C."
7. Use the grid pattern to layout the pattern for the legs "C."
8. Transfer the pattern to three pieces of stock 3/4" x 7 1/4" x 7 1/2".
9. Use a scroll saw, Bandsaw or jigsaw to cut out the legs. Save one piece of scrap from the outside curve for future use.
10. Use a drum sander to and the curves of the legs.
11. Use a router with a piloted 1/4" rounding over bit to shape the curved edges of the legs. Do not shape the straight section.
12. Use a drum sander to sand a concave curve in the straight portion of the leg. This makes for a better fit when attaching the legs to the spindle.
13. Sand the legs and set aside.
14. Divide the base diameter of the spindle into three equal parts 120 degrees apart. Draw vertical lines on the base of the spindle to form the centerlines for the leg dowel holes.
15. Use dowel centers to mark the holes to be drilled in the spindle. In the vertical drill press mode, drill the 3/8" diameter holes in the spindle. Set up the table and rip fence to form a V-block to cradle the turning.
16. Glue and clamp the legs to the spindle, one at a time, to allow each leg time to set up. The scrap cutting from Step 9 will aid in clamping. With a square, check the bottom of the leg to assure it's square to the outside of the spindle.
17. Glue and clamp the stock to form the 16" x 16" piece for the top (B). Let glue dry for at least 24 hours.



1. Layout the 16" diameter circle for the top. Belt and surface of top blank smooth.
   NOTE: Mark the center for future use.

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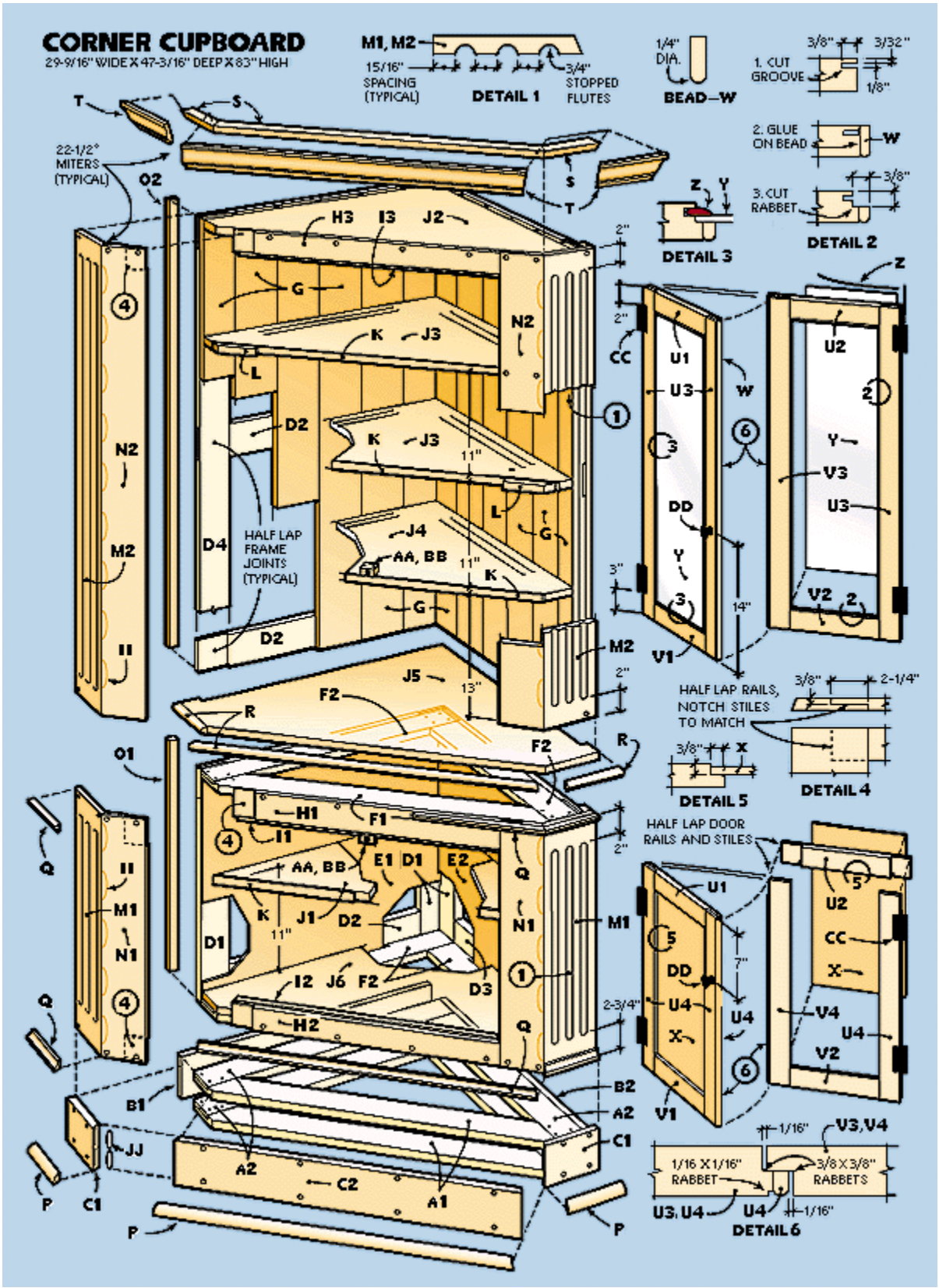
2. With a scroll saw, Bandsaw or jigsaw cut out the top (B).
3. Disc sand the edges of the top.
4. Use a router with a 1/4" Roman ogee bit to shape the top edge of B. **NOTE:** The surface with the marked center should be on the bottom.
5. On the bottom of the table top, use a 1" Forstner or Brad-point bit to drill a 1" diameter hold through to brace (E).
6. Sand the table top.
7. Cut angled ends on brace with Bandsaw. Sand with disc sander or belt sander. Drill for screw holes.
8. Screw the top brace to the spindle.
9. Screw the brace to top.
10. Apply the finish of your choice.

CORNER CUPBOARD



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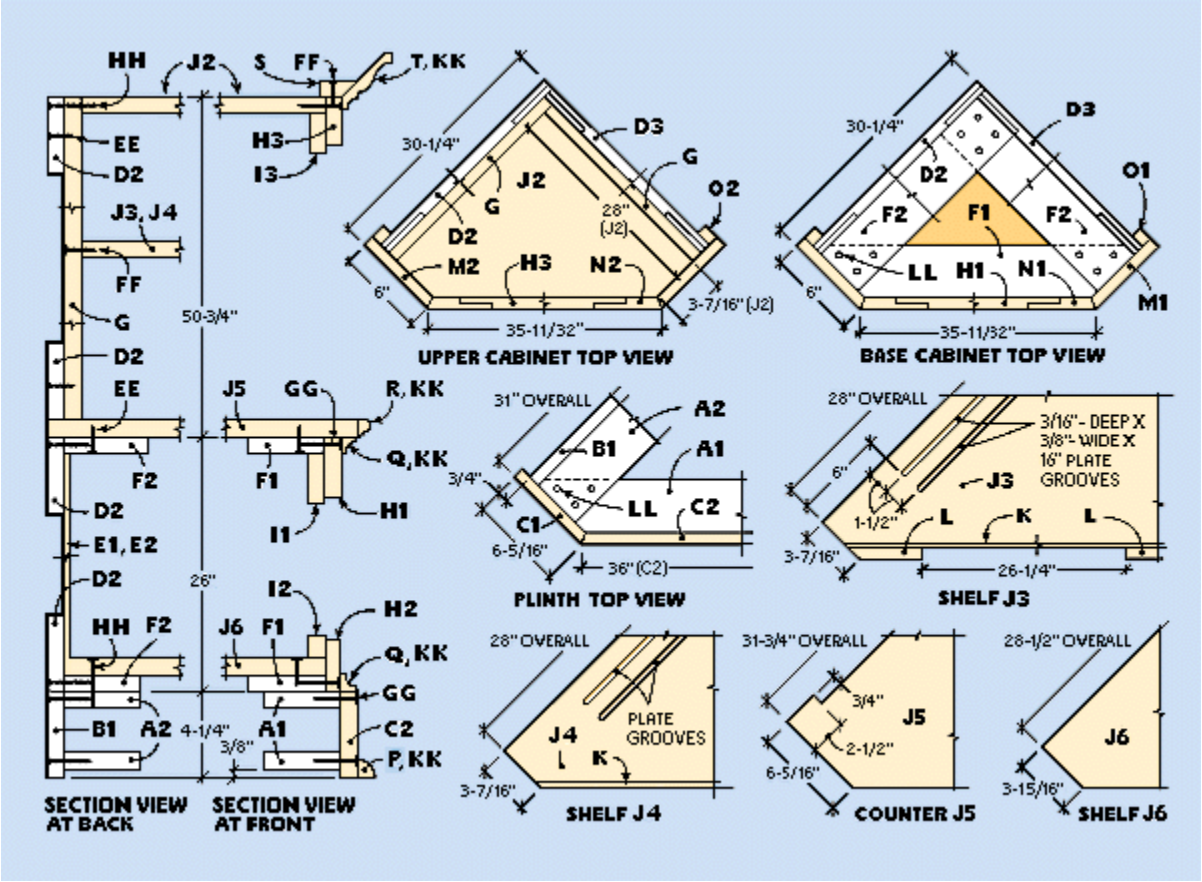


Materials List

Key	No.	Size and description (use)
A1	2	3/4 x 3 1/2 x 41 3/4" pine (plinth frame)
A2	4	3/4 X 3 1/2 X 29 1/2" pine (plinth frame)
B1	1	3/4 X 4 1/4 X 30 1/4" pine (plinth back)
B2	1	3/4 X 4 1/4 X 29 1/2" pine (plinth back)
C1	2	3/4 X 4 1/4 X 6 5/16" pine (plinth front)
C2	1	3/4 X 4 1/4 X 36" pine (plinth front)
D1	4	3/4 X 3 1/2 X 26" pine (back frame)
D2	5	3/4 X 3 1/2 X 29 1/2" pine (back frame)
D3	5	3/4 X 3 1/2 X 28 3/4" pine (back frame)
D4	4	3/4 X 3 1/2 X 50" pine (back frame)
E1	1	1/4 X 24 1/2 X 28 3/4" plywood (back panel)
E2	1	1/4 X 24 1/2 X 28 1/2" plywood (back panel)
F1	2	3/4 X 3 1/2 X 40 5/8" pine (frame)
F2	4	3/4 X 3 1/2 X 28 3/4" pine (frame)
G	12	3/4 X 5 1/2 X 50" pine (back panel)*
H1	1	3/4 X 2 3/4 X 30 9/16" pine (rail)

H2	1	3/4 X 2 3/8 X 30 9/16" pine (rail)
H3	1	3/4 X 2 1/4 X 30 9/16" pine (rail)
I1	1	3/4 X 2 1/4 X 30" pine (doorstop)
I2	1	3/4 X 1 X 30" pine (doorstop)
I3	1	3/4 X 13/4 X 30" pine (doorstop)
J1	1	3/4 X 26 5/8 X 26 5/8" plywood (shelf)
J2	1	3/4 X 28 X 28" plywood (top)
J3	1	3/4 X 28 X 28" plywood (shelf)
J4	1	3/4 X 28 X 28" plywood (shelf)
J5	1	3/4 X 313/4 X 313/4" plywood (counter)
J6	1	3/4 X 28 1/2 X 28 1/2" plywood (bottom)
K	1	1/4 X 3/4" X 12' pine (edge band)**
L	4	3/4 X 3/4 X 5" pine (spacer)***
M1	2	3/4 X 6 X 26" pine (side)
M2	2	3/4 X 6 X 50" pine (side)
N1	2	3/4 X 4 5/8 X 26" pine (stile)
N2	2	3/4 X 4 5/8 X 50" pine (stile)
O1	2	3/4 X 1 X 26" pine (cleat)
O2	2	3/4 X 1 X 50" pine (cleat)
P	1	3/4" X 5' pine quarter round (trim)**
Q	1	5/8 X 3/4" X 10' pine cove (trim)**
R	1	5/8 X 3/4" X 5' pine cove & nose(trim)**
S	1	3/4 X 1 3/4" X 5' pine (cleat)**
T	1	31/2" X 5' pine crown (trim)
U1	2	3/4 X 1 7/8 X 12 7/8" pine (top door rail)
U2	2	3/4 X 1 7/8 X 13 1/8" pine (top door rail)
U3	3	3/4 X 1 7/8 X 35" pine (top door stile)
U4	3	3/4 X 1 7/8 X 20 3/4" pine (lower door stile)
V1	2	3/4 X 2 1/4 X 12 7/8" pine (lower door rail)
V2	2	3/4 X 2 1/4 X 13 1/8" pine (lower door rail)
V3	1	3/4 X 2 1/8 X 35" pine (top door stile)
V4	1	3/4 X 2 1/8 X 20 3/4" pine (lower door stile)
W	1	1/4 X 3/4" X 22' pine lattice (beading)**
X	2	1/4 X 9 1/4 X 17" plywood (door panel)
Y	2	1/10 X 9 5/8 X 31 3/4" glass (door glass)
Z	1	15' glass retainer, No. 27078**†
AA	2	3/4 X 1 X 1 3/8" pine (latch block)
BB	2	magnetic latch
CC	2	pair H hinges, No. 76067

DD	4	knob, No. 76117
EE	As reqd.	1 1/4" drywall screw
FF	As reqd.	1 1/2" drywall screw
GG	As reqd.	2" drywall screw
HH	As reqd.	2 1/2" drywall screw
II	As reqd.	No. 20 joining plate
JJ	As reqd.	No. 0 joining plate
KK	As reqd.	1 1/4" finishing nail
LL	As reqd.	3/4" finishing nail
Misc: Glue, paint, and 1/8"-radius half-round router bit (part #TF82102) available at *Trendlines*, 135 American Legion Highway, Revere, MA 02151; call 800/767-9999 to order).		
* 1x6" beaded tongue-and-groove ** Overall quantity indicated, cut to length as required. *** Cut to fit †(available at *The Woodworkers' Store*, 4365 Willow Drive, Medina MN 55340; call 800/610-0883 to order)		

Case Construction

Begin by cutting 1 x 4 stock to length for all of the 31/2-in. frame members. Rip 1 x 6 stock to 41/4 in. for the wider plinth frame pieces. Mark all of the square half lap joints for the vertical and horizontal frames, and code the pieces with letters so you won't get them mixed up.

Build a router lapping jig by securing two 16-in.-long 1 x 6 boards to a worksurface so they're 31/2 in. apart. At one end of the space between the 1 x 6s, secure a 6-in.-long 1 x 4 stopblock between the boards. Then place the first workpiece between the 1 x 6s and against the stopblock. Measure the distance from the edge of your router's baseplate to the cutting edge of a 3/4-in. straight bit, and use this dimension to locate the four guide strips that will limit the router's path to the size of the half lap joint.

With the bit set for a 3/8-in.-deep cut and the workpiece butted against the stopblock, shape the half lap while moving the router within the four guide strips **(Photo 1)**. To cut the angled half lap joints in the horizontal frames, first lay the parts together and mark the 45 degree joints. Then, build similar jigs for these pieces and rout the half lap joints.

Apply glue to the mating surfaces of all the joints, assemble and then drive four 3/4-in. nails from each side of each joint. Double-check that the frames are square and set them aside until the glue dries.

Crosscut boards for the upper and lower case sides and stiles to finished length. Then, plane one edge of each board straight and smooth. Adjust your circular saw for a 22 1/2 degree bevel and tack a straight-edge guide strip to each piece to cut the beveled edges **(Photo 2)** and plane smooth. Mark the joining plate locations and cut the slots with a plate joiner. If your plate joiner fence can't be set for the angled edge of the work, construct a 22 1/2 degree platform jig to hold the joiner square to the edge **(Photo 3)**.

Before joining the case sides to the stiles, install a 3/4-in. corebox bit in your router and cut the stopped flutes in the sides. Use a router fence to make the cuts, as shown. If you don't have a router fence, mount your router to a shop-built sliding carriage **(Photo 4)**. Set the fence to make the two outer flutes first, then reset it for the middle flute. Rout the blind half laps at the top of the upper case stiles and at the top and bottom of the lower case stiles.

To join the sides to the stiles, first make a set of L-shaped clamping brackets **(Photo 5)**. Cut the upper edge of the short leg of each bracket at 45 degree. Apply glue to the plate joints and along the beveled edges. Clamp the brackets to the case sides, and draw the sides to the stiles with bar or pipe clamps.

Next, glue and screw together the two rear

1 --Rout the half lap joints with a straight bit. Hold workpiece in a jig that has guide strips to confine the cut to the lap area.

2 --After planing one edge of the case sides and stiles, use a circular saw to cut 221/2 degree bevel. Use a straight strip to guide saw.

3 --Cut the plate joint slots in the beveled edges of the case sides and stiles. Build a jig to hold the joiner at 221/2 degrees if required.

frame subassemblies to create the back corner frame for the upper and lower cases. Cut to length 12 50-in. pieces of 1 x 6 beaded tongue-and-groove pine. Then, starting at the corner of the upper case frame, attach the boards with glue and screws driven from the back of the frame **(Photo 6)**. Rip the last board on each side to exact width before installing. Follow this step by adding the 3/4 x 1-in. cleats, as shown. Cut to size the plywood shelves, the upper case top, lower case bottom and counter with a circular saw and plywood blade. Use a sabre saw to finish the long notch on each back edge of the counter. Use a 3/8-in.-dia. corebox bit to rout the 3/16-in.-deep plate grooves in the three upper shelves.

Temporarily clamp the top and the three shelves to the upper case back assembly. Tack triangular blocks to the panels to provide clamping surfaces **(Photo 7)**. Then, bore screw pilot holes for attaching the panels to the back assembly. Remove the shelves, add the edge banding and attach the spacer blocks, as shown. Reassemble the shelves and back with screws and glue. Mark the exact position of the upper face rail and install. Finally, bore countersunk pilot holes for installing the side/stile subassemblies and install with glue and screws **(Photo 8)**. Join the triangular lower case frames to the rear frames with screws and glue **(Photo 9)**.

4 --Use a corebox bit and router to make the stopped flutes. A shopmade carriage supports router in correct position.

5 --Attach L-shaped pieces to side to facilitate clamping side to stile. When the glue has cured, scrape away excess.

6 --After back frames have been assembled, secure the beaded paneling

with glue and screws driven from the back of frame.

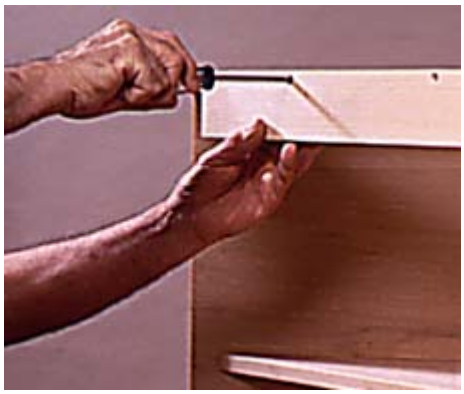
7 --After cutting shelf panels, tack triangular blocks to corners and clamp panels to back assembly. Bore screw pilot holes.

8 --Join shelves to back with screws and glue. Then, apply glue and install side and stile assemblies with countersunk screws.

Attach the 1/4-in. plywood panels with glue and nails. Screw and glue the case bottom and shelf to the assembly, and add the face rails **(Photo 10)**. Finally, secure the side/stile subassemblies.

9 --Use screws and glue to join the triangular lower frames to the back frames. Bore pilot holes to avoid splitting the wood.

Miter the ends of the plinth face pieces and slot for plate joints. Then, screw and glue the plinth backs to the triangular frames. Add the long front face piece, and finish the assembly by attaching the ends **(Photo 11)**.



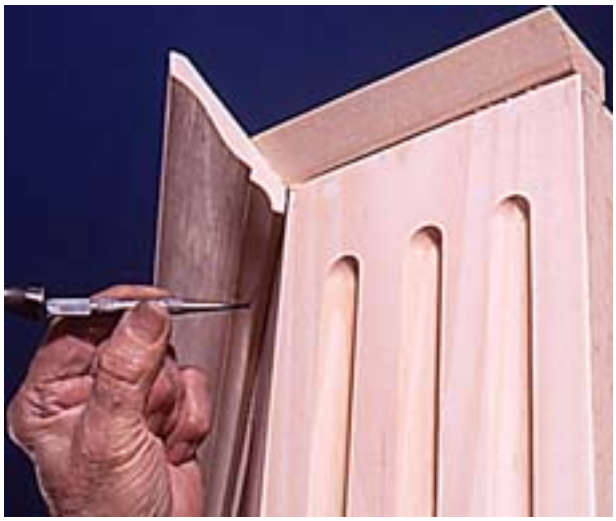
10 --After the lower case frame and back panels have been assembled, add the rails that go across the top and bottom.

Doors And Trim

Rip the beveled cornice support cleat to size with a 45 degree bevel on one edge. Then, use a simple wood miterbox to cut the 22 1/2 degree miters at the exact length. Next, glue and nail the cleats to the case top.

To cut the compound cornice miters, place the stock in the miterbox and tilt it at a 45 degree angle so its top edge is on the base of the miterbox and the back edge rests against the back of the miterbox. Cut the long section first. Then, cut the miters for the case sides to exact length. Attach the crown molding with glue and finishing nails **(Photo 12)**. Miter the remaining trimpieces to exact length, and install with glue and finishing nails **(Photo 13)**. Set all nails below the surface, fill and sand smooth.

11 --Use plates to join the plinth face pieces. Join the long piece to the plinth frame first, then add the short endpieces.



12 --Attach the long crown section first. Miter the endpieces to exact length, and then glue and nail to cleat. Set nails and fill.

13 --Miter remaining molding to length, and install each profile, long piece first. Use glue and finishing nails.

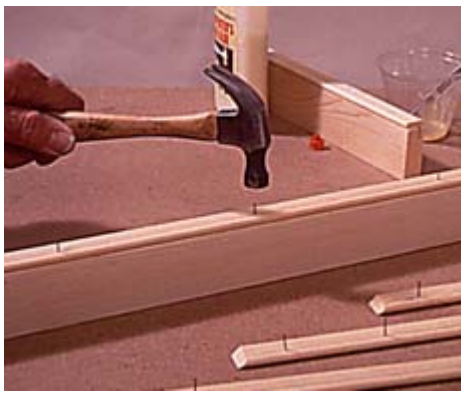
After the molding has been installed, secure the plinth to the lower cabinet section with 2 1/2-in. screws. Use 2-in. screws to attach the counter to the upper case, and then attach the upper case to the lower case with 1 1/2-in. screws driven up into the bottom of the counter. Cut the door rails and stiles from 1 x 3 stock. Use a router to shape the half lap joints. Then, use a 1/8-in. slotting cutter to rout the stopped grooves in the upper doors for the glass-retaining strips **(Photo 14)**. Set up your router table with a 1/8-in.-rad. half-round bit, and round one edge of the 1/4-in.-thick pine lattice for the door beading **(Photo 15)**. Use the miterbox to cut the lattice to length. Then, attach the beading to the inside perimeter of the upper door frames -- and along the opening edge of the upper and lower left doors-with glue and 3/4-in. brads placed near the outer face of the door **(Photo 16)**. Rout the rabbet for the glass, and square the corners with a sharp chisel. Then, rout the overlapping rabbets along the door-opening edges, as shown.

Install the glass, cutting the plastic retaining strips to exact length with a knife, and glue the 1/4-in. plywood panels in the lower doors. Finally, shim the doors, mark the hinge and knob screwhole locations and install the hardware **(Photo 17)**.

To finish the cabinet, remove the glass and disassemble the sections. Apply one coat of latex primer, tinted to the final color, followed by one finish coat of paint. We used Sherwin-Williams Birdseye Maple Latex Satin House and Trim Paint. After it's dry, reassemble the cabinet.

14 --Use a router with a piloted slotting bit to cut the slots in the upper door frames for the plastic glass-retaining strips.

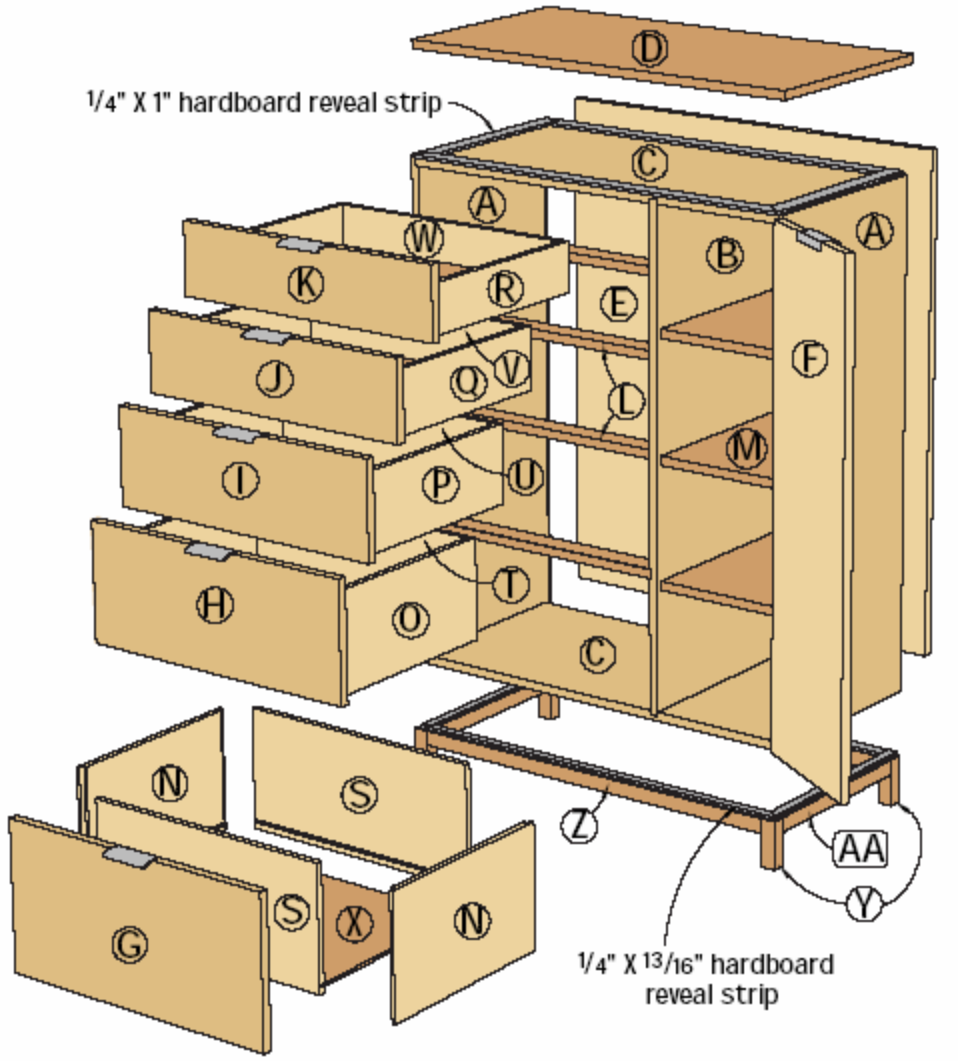
15 --Make the beading from 1/4-in. lattice. Cut the round edge with a 1/8-in.-rad. half-round bit mounted in a router table.



16 --Nail and glue the beading to the door-frame pieces. Then, cut glass and door overlap rabbets with a router and straight bit.

17 --Clamp upper doors in place and shim to achieve equal clearance all around the frame. Then, install the H hinges.

WARDROBE



Construction begins by cutting the case pieces to size. Next, cut 3/8" x 3/4" rabbets on the back, top and bottom of both side pieces to accept the back, top and bottom. Also rabbet the top and bottom pieces on the back edge to hold the back. Now cut a 3/8"-deep x 3/4"-wide dado in the top and bottom pieces to leave an 11" opening between the right side and the vertical partition.

SHELF PIN SETUP • Before assembly it's best to mark and drill the locations for the shelf pins, and to lay out and mount the base plates for the hinges. As always, a little masking tape on the drill bit makes a handy depth stop.

Before rushing to assemble the case, there are a few things to do first. Cut your four drawer dividers to size and apply veneer tape to the front edge of each. Mark the location of the drawer dividers and decide whether you want to use biscuits or dowels to hold the drawer dividers in place between the left side and the partition. The drawer openings are graduated in size and should be as follows from top to bottom: 5"; 5-7/8"; 7-1/4"; 9" and 11-1/8".

Because the door section of the wardrobe is only 11" wide, it's a good idea to pre-drill the right side and partition for shelf pins and also for the European-style hinge plates before assembly. One more pre-assembly task: sand the inside of the shelf section and the part of the back that's visible. You'll be glad you did.

Now assemble the case using glue and by driving nails through the top and bottom pieces into the sides and partition. When in place, the drawer dividers should be proud of the front edge of the case by the thickness of the veneer tape. Lastly, nail

the back in place into the rabbets. This will square up the case.

With the case assembled, go nab your spouse's iron. Apply veneer tape to the front edges of the case, and to the top of the case on the front edge and sides to hide the rabbet joint. The 7/8"-wide tape is plenty because the reveal will only show 1/4" of the top of the case.

The false top is simply a piece of plywood edged with veneer tape. Check the size against the finished size of the assembled case to make sure the false top will flush up with the sides, front and back. Remember that the false top extends over the door and drawers and should flush up to them. The 1/4" reveal between the top and case is created using strips of 1/4" x 1" hardboard, with one edge spray painted black. Fit the strips to the underside of the top, allowing the 1/4" setback on the front and sides. Add a fourth strip flush to the rear of the top to level it out. With the strips fit, use black spray enamel paint to coat the visible edge and the underside of the front piece, then attach the reveal strips to the underside of the top.

Now attach the false top to the case. Drill clearance holes through the case and attach the false top using screws up through the inside of the case, again, flushing the back edges of the case and the false top.

The base is a simple frame held together by biscuits, dowels or mortise-and-tenon joinery, with the legs attached between the stretchers at the corners. With the base glued and assembled, add 1/4" x 13/16" hardboard strips to the top edge as you did to the underside of the top. Next, finish the base and strip with black paint to add visual "weight" at the base of the chest. When dry, attach the base to the cabinet using metal chair braces at the corners.

Now build the drawers using simple 1/4" x 1/2" rabbet joints on the sides, with the fronts and backs captured between the sides. The bottoms slide into 1/4" x 1/4" grooves in the sides and front that are cut 1/2" up from the bottoms of the drawer pieces. The back is cut 1/2" shorter than the front to allow the bottoms to slide into place. Use the bottoms to hold the drawers square while the glue dries, then remove them to make finishing the drawers easier. I set up a 1/4" radius router bit in a router table and ran the top edges of the drawer parts (both sides) to make them more finger-friendly. Don't round over the front edge where the drawer face will attach. With the drawers assembled, attach the drawer slides to the cabinet and to the drawer sides and check for smooth operation.

Cover the edges of the drawer faces and the door with veneer tape. Then rout the a shallow mortise centered in the top edge of each for the pulls. Use a router with a straight bit. See the photo above for the jig I built for this.

I want to mention that the screws provided with the pulls are round-head screws. In an effort to keep things flush and simple I used a countersink on the clearance holes in the pulls and then used flat-head screws to attach the pulls. Now attach the drawer faces to the drawers using the hardware shown in the photo at right. This allows for easy adjustment.

Now drill the door to accept the European hinges and mount them to the cabinet. If you haven't used concealed hinges before, take a few minutes to play with the adjustment to get a feel for the versatility of these hinges.

Lastly, cut a groove the length of both sides of the shelves and then add veneer tape to the front edge. The shelf pins shown slip into the slots in the shelves and provide invisible support. It's your choice whether to make the shelf locations adjustable by adding more shelf pin holes. I preferred to use set locations to keep the interior clean and unmarred.

The case is now ready to finish. Remove the hardware and finish sand. Use a clear

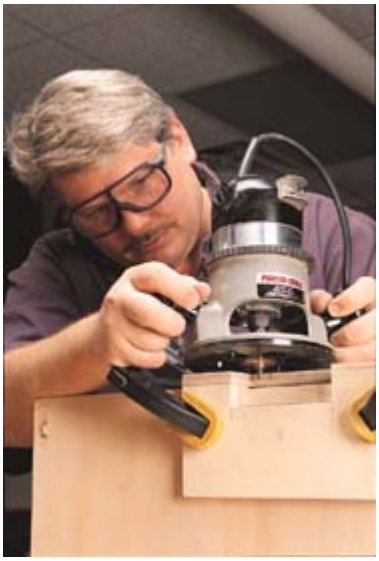
HARDBOARD REVEAL • The hardboard reveal strip is painted black, then mitered to extend beyond the front of the cabinet itself. The reveal strip is recessed 1/4" in from the edges of the top.

LEARN SOMETHING FROM THE EUROPEANS• European hardware is a broad term covering a number of hinges and shelving systems. Best known for its use in commercial furniture, I chose to use it in this piece for a number of reasons. The door hinges allow adjustment of the door in three dimensions after the door is attached, and it is invisible from the exterior of the piece, keeping the lines clean and simple. The hinges do require a 35mm Forstner bit ($14.99) to insert the hinges in the side of the cabinet, and a jig designed just for installing ³cup² hinges is available from Rockler (800-279-4441) for $29.99, (item #10260).

Contemporary decorative hardware can be tricky to find, so I was pleased to find Spokane Hardware on the Internet. Offering a large and varied selection of contemporary, fanciful and traditional hardware for sale on the web, this saves a lot of time running from store to store. The pulls selected for this piece are commercially available to cabinet shops, but it's nice to find them accessible for the home woodworker as well.

This was the first time I'd used the drawer front adjusters, though they've been available for years. Having fought with adjusting drawer fronts on inset and flush-mount drawers forever, I found these clever plastic devices to be a big help. Allowing 1/8" adjustment in any direction, fine-tuning a drawer front is now a snap rather than a chore. Though the instructions specify a 25mm bit to mount the adjuster in the drawer face, a 1" Forstner works admirably with a little shimming.

finish everywhere, and don't worry about coating the black accent strips. After the finish has dried, attach the hardware and hang the door. Adjust the drawer fronts and door to make all the spaces equal. Then step back and enjoy the clean simple lines of your work -- until the tastes of the furniture world swing back the other way. Then perhaps you'll have to apply some fancy moulding or something.



JIG FOR THE PULLS • I cut the top and back recesses for the handles using the same jig. Unfortunately I made my jig a little short and had to move the clamps between cuts. Make your jig the width of the drawer and to fit your own router template guides and you'll be in good shape.

ADJUSTABLE DRAWERS • The drawer face adjusters are attached by first drilling two clearance holes in the drawer box front. Then locate the approximate spacing of the drawer face on the drawer front (the closer the better) and make a mark through the clearance hole on the back of the face with a scratch awl. Remove the drawer box and drill the 1" holes for the adjusters. Then just screw the face on and adjust.

Schedule of Materials: Modern Wardrobe

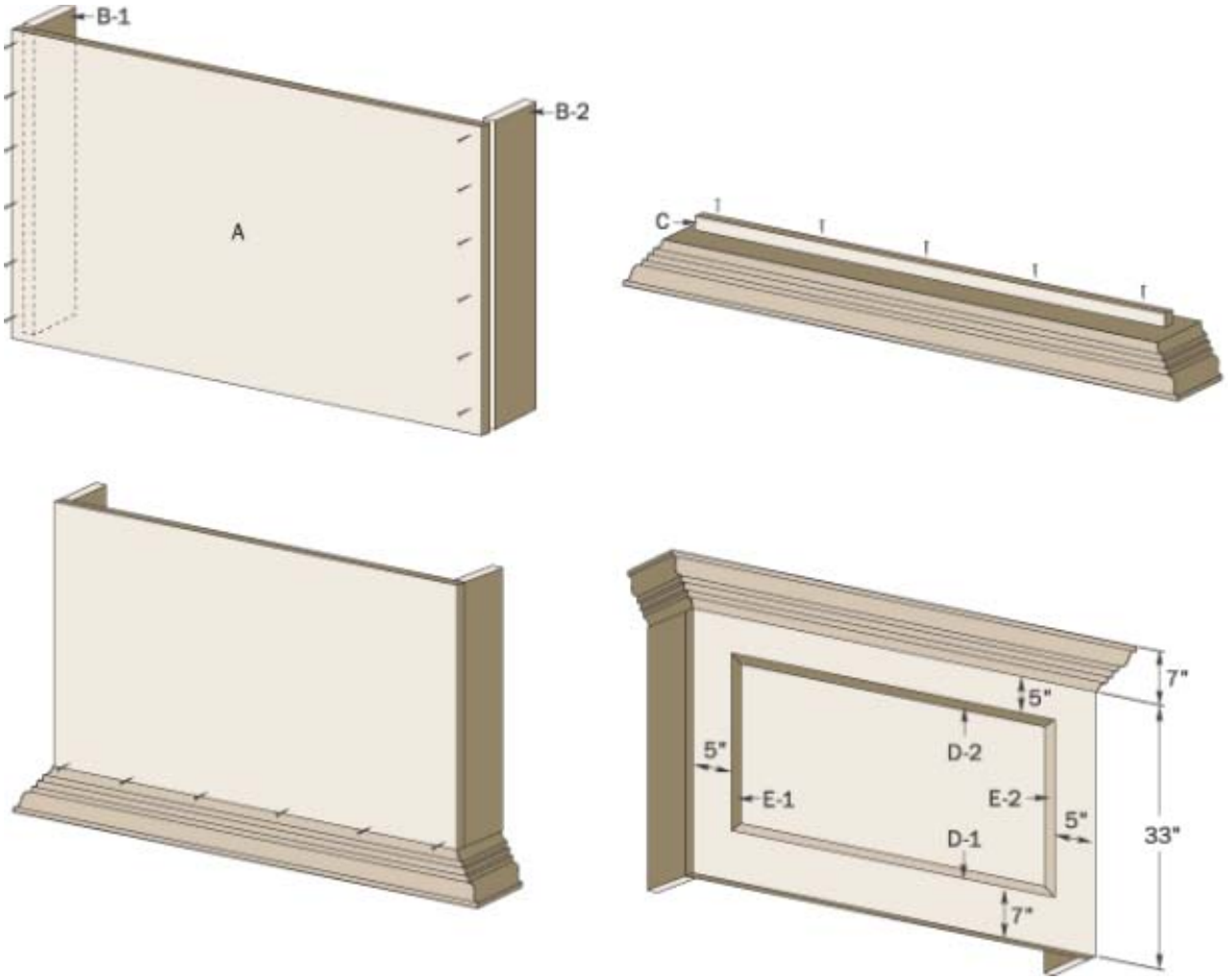
No.	Item	Dimensions	Material
2	Sides (A)	3/4" x 17-1/4" x 42-3/4"	Maple ply
1	Partition (B)	3/4" x 16-1/2" x 42"	Maple ply
2	Top/bottom	3/4" x 17-1/4" x 35-1/2"	Maple ply
1	False top (D)	3/4" x 18" x 36"	Maple ply
1	Back (E)	3/4" x 35-1/4" x 42"	Maple ply
1	Door (F)	3/4" x 12" x 42-1/2"	Maple ply
1	Drawer face (G)	3/4" x 12" x 23-7/8"	Maple ply
1	Drawer face (H)	3/4" x 9-9/16" x 23-7/8"	Maple ply
1	Drawer face (I)	3/4" x 7-13/16" x 23-7/8"	Maple ply
1	Drawer face (J)	3/4" x 6-7/16" x 23-7/8"	Maple ply
1	Drawer face (K)	3/4" x 5-7/8" x 23-7/8"	Maple ply
4	Drawer dividers (L)	3/4" x 2" x 22-7/8"	Maple ply
3	Shelves (M)	3/4" x 16" x 10-15/16"	Maple ply
2	Drawer sides (N)	1/2" x 10-1/16" x 16"	Baltic birch
2	Drawer sides (O)	1/2" x 8-1/16" x 16"	Baltic birch
2	Drawer sides (P)	1/2" x 6-1/4" x 16"	Baltic birch
2	Drawer sides (Q)	1/2" x 5" x 16"	Baltic birch
2	Drawer sides (R)	1/2" x 4" x 16"	Baltic birch
2	Drawer frt & Back (S)* (R)	1/2" x 10-1/16" x 21-1/4"	Baltic birch
2	Drawer frt & back (T)*	1/2" x 8-1/16" x 21-1/4"	Baltic birch
2	Drawer frt & back (U)* (R)	1/2" x 6-1/4" x 21-1/4"	Baltic birch
2	Drawer frt & back (V)*	1/2" x 5" x 21-1/4"	Baltic birch
2	Drawer frt & back (W)*	1/2" x 4" x 21-1/4"	Baltic birch
5	Drawer bottoms (X)	1/4" x 21-1/4" x 15-3/4"	Luan
4	Legs (Y)	1-1/4" x 1-1/4" x 4"	Poplar
2	Base stretchers (Z)	3/4" x 1-1/4" x 33-7/16"	Poplar
2	Base stretchers (AA)	3/4" x 1-1/4" x 15-9/16"	Poplar

9 - Linear feet each of 1/4" x 1" and 1/4" x 13/16" hardboard reveal strip

75 - Linear feet of 7/8" maple veneer tape

*If using a "slide in" drawer bottom, subtract 1/2" from the height on the drawer backs.

HEADBOARD



Construction Materials

- 1 (76") mantel shelf (special order in millwork department)
- 1 sheet (3/4") birch plywood
- 1 (6') 1 x 3 poplar board
- 1 (8') 2 x 2 furring strip
- 2 (8') lengths of picture molding
- 12 8d sinker nails
- 36 8d finishing nails
- 20 4d finishing nails

Cut List			
Part	**Material**	**Cut Size**	**Qty**
(A) Front panel	3/4" plywood	33 x 74-1/2"	1
(B) Side panels	1 x 3 board	33"	2
(C) Nailing cleat	2 x 2 board	73-1/2"	1
(D) Molding strips	picture molding	miter to 66"	2
(E) Molding strips	picture molding	miter to 21"	2

Step 1: Before cutting materials, measure the exact width of the underside of the mantel from inside edge to inside edge. Each mantel is custom made, and you will want your base to fit snugly against it. This will determine the width of the front panel. The mantel pictured here begins with a 74 1/2 x 33" front panel.

Step 2: Cut all other materials per list.

Step 3: Attach side panels to front panel using wood glue and 2 1/2", 8d finishing nails. Set aside for glue to dry. This will be the base of the headboard.

Step 4: (Note: Steps 4 and 6 require at least two people.) Place the mantel upside down on a flat work surface, and position the base on the underside flush with the front inside edges, or lip, of the mantel. Trace with a pencil along the base to indicate where the cleat needs to be attached. This should be approximately 3/4" from the front and two sides of the mantel lip.

Step 5: Attach a 2 x 2 cleat along the guideline with wood glue and 8d sinker nails placed 6 inches apart. Allow to dry.

Step 6: Reposition base on the underside of mantel, and attach to the cleat, nailing from the front of the base into the cleat with 8d finishing nails every 6".

Step 7: Miter and attach picture molding on the front using 4d finishing nails.

Step 8: Countersink nails, fill holes with wood putty, and then sand.

Step 9: Prime and paint headboard to match the room's decor. For the look of the one pictured, begin with a coat of American Tradition, Belle Grove Light Amber #94-1B, satin. Next, dilute some mocha glaze with water, and brush it on generously. Wipe away some of the glaze with smooth clean cotton rags. Apply a second layer to darken the glaze. The more layers applied, the more aged the headboard will appear.

Step 10: Allow to dry for 24 hours. Apply a coat of polyurethane to protect the finish.

Step 11: Hang the headboard per manufacturer's instructions for mounting mantel.

JEWELRY BOX

Bill of Material

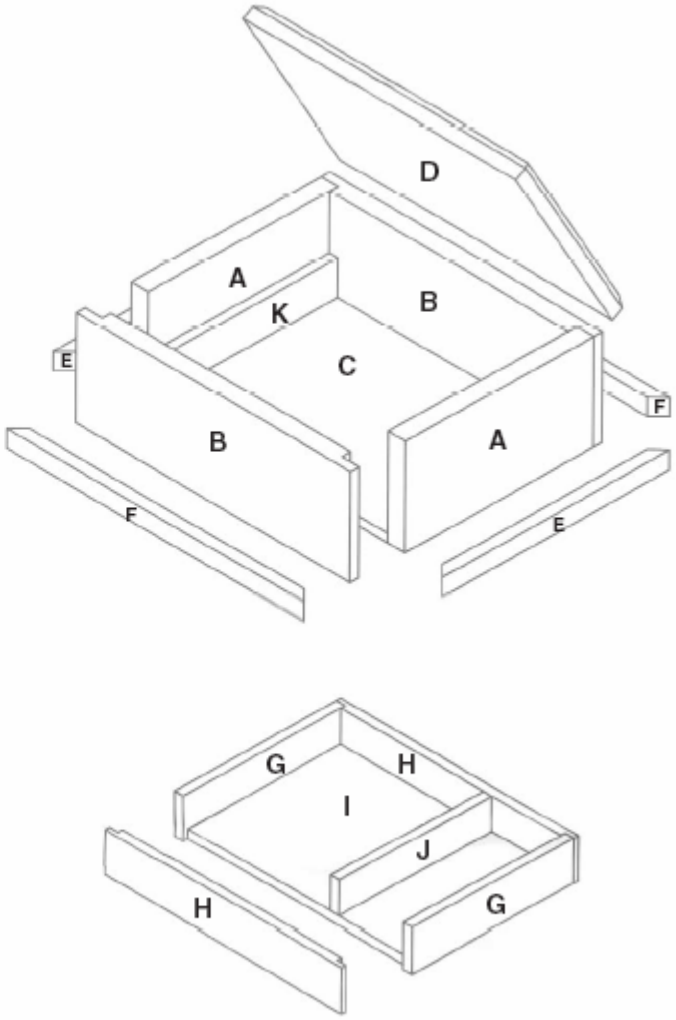
Quantity	Size	Material	Item
1	3/4" x 6" x 6'	Maple	A, B, D
1	3/8" x 6" x 6'	Maple	C, G, H, I, J, K
1	1/2" x 3/4" x 5'	Maple Molding	E, F
1 Pair	1 1/2"	Butt Hinges	
1		Small Box Lock	
1	Small Bottle	Wood Glue	
1	Pint	Finish	

Cutting Schedule

Part	Qty	T	W	L	Material
A	2	3/4"	4 1/4"	8 1/4"	Maple
B	2	3/4"	4 1/4"	12"	Maple
C	1	3/8"	7 1/2"	10 1/2"	Maple
D	1	3/4"	9"	12"	Maple
E	2	1/2"	3/4"	10"	Maple
F	2	1/2"	3/4"	13"	Maple
G	2	3/8"	1 3/4"	7"	Maple
H	2	3/8"	1 3/4"	10 3/8"	Maple
I	1	3/8"	6 5/8"	9 5/8"	Maple
J	1	3/8"	1 3/8"	6 5/8"	Maple
K	2	3/8"	1 1/2"	7 1/2"	Maple

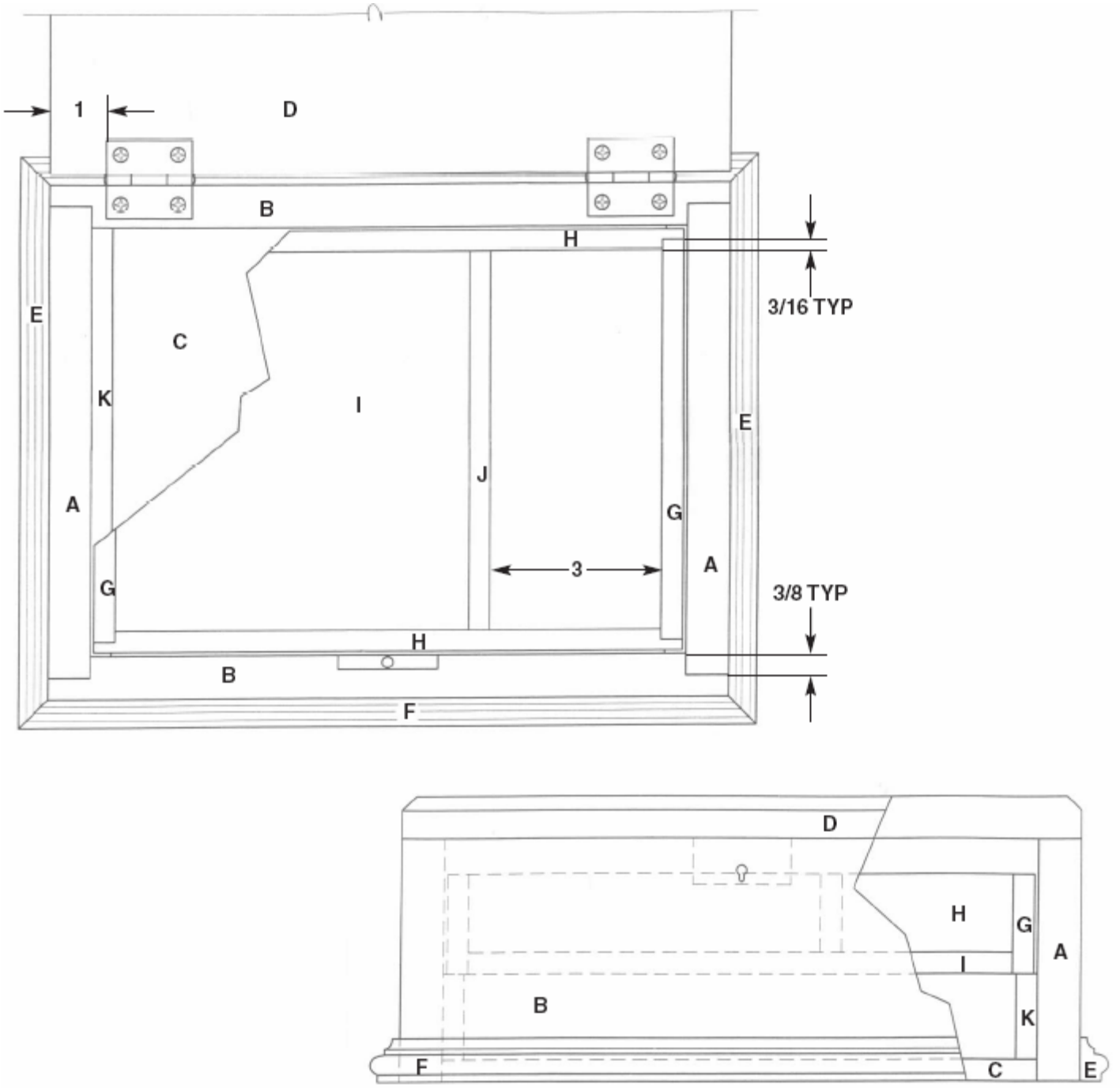
NOTES

1. Although maple is preferred for this project, other wood may be substituted.
2. You may add more partitions to or relocate board (J) in the removable tray.
4. Read manufacturer's instructions before operating equipment.
3. Always wear safety glasses.



Assembly Instructions

1. Read all instructions before beginning any work.
2. Cut all material to sizes shown in cutting schedule. (This is a good time to cut out the area for installing a lock.)
3. Glue and clamp boards (B) to boards (A). Check assembly for squareness.
4. Glue the bottom of the box (C) to assembly (A, B).
5. Glue and clamp boards (G) to boards (H). Check assembly for squareness. Glue the bottom of the box (I) to assembly (G, H).
6. Install board (J) with glue to tray assembly. Cut tray supports (K) to fit box assembly.
7. Cut 45 degree miter on molding pieces (E) and (F) and glue to box.
8. Sand, apply finish and install hardware.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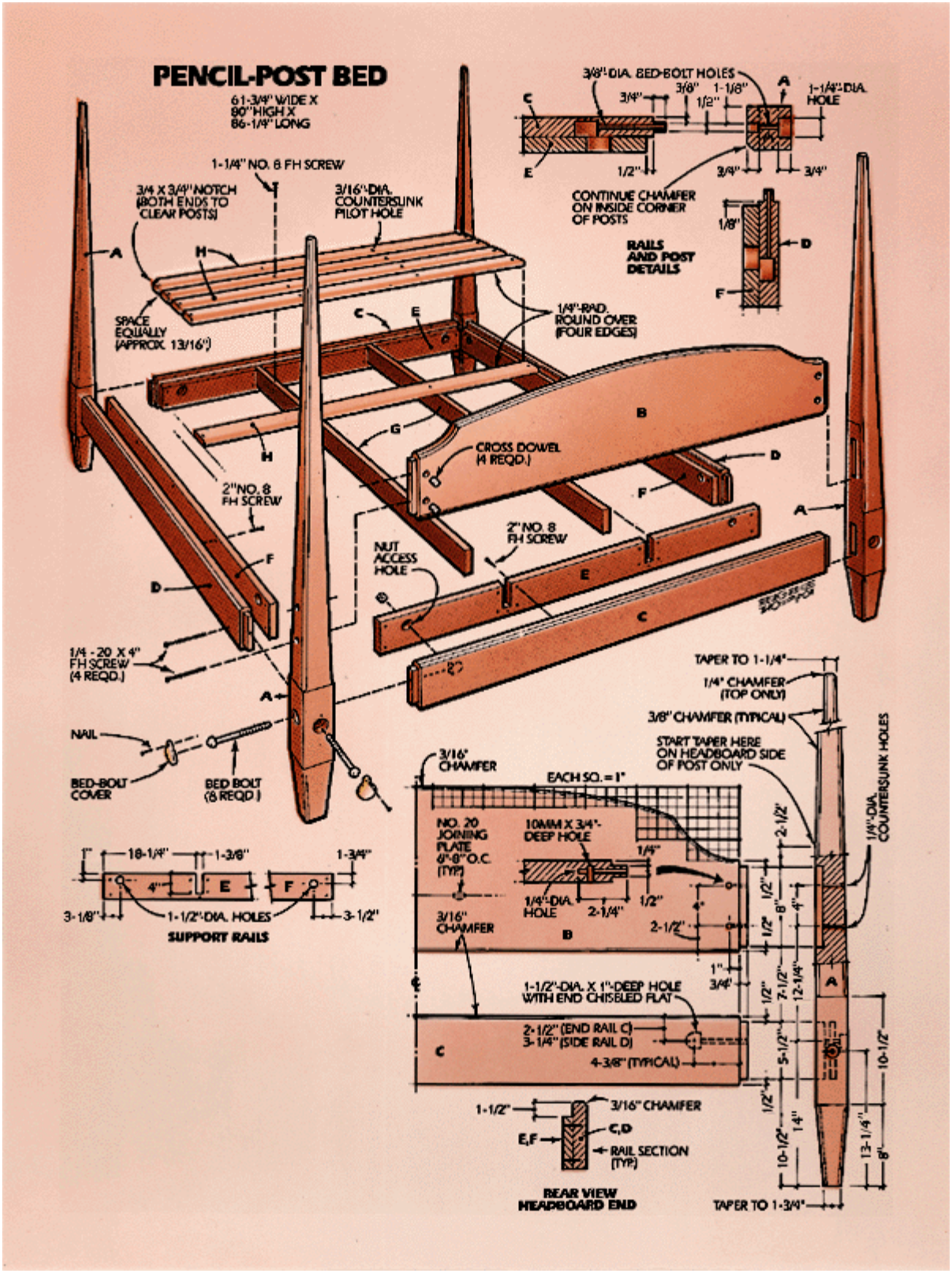
PENCIL BED



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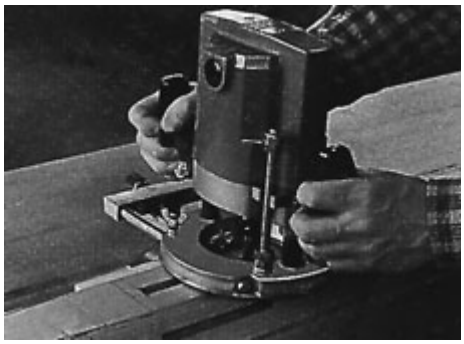
Materials List Pencil-post bed		
Key	**No.**	**Size and Description (use)**
A	4	2 3/4 x 2 3/4 x 80" cherry (post)
B	1	1 x 16 x 60 3/4" cherry (headboard)
C	2	1 1/4 x 6 1/2 x 60 3/4" cherry (end rail)
D	2	1 1/4 x 6 1/2 x 80 3/4" cherry (side rail)
E	2	1 x 5 x 58 1/4" poplar (end support rail)
F	2	1 x 5 x 79" poplar (side support rail)
G	2	1 3/8 x 4 x 80 3/4" poplar (side support)
H	14	3/4 x 5 x 60 3/4" maple (slat)

The Posts

Begin by preparing the blanks for the bedposts. Glue up stock if necessary, then joint, rip and crosscut the blanks to 2 3/4 in. wide € 80 in. long. Use a long straightedge to lay out the tapers on each side of the posts (**Photo 1**). The taper on the inside edge of the headboard posts begins 15 in. higher than the other tapers. This allows for a square joint with the headboard.

1 Rip and crosscut the post blanks, and use a long straightedge to mark the taper. Also mark the mortise positions.

Lay out and cut the mortises in each post at this point -- it's easier to do this now, while the posts are straight, than after the tapers are cut. The quickest way to cut the post mortises is by using a plunge router with a 1/2-in.-dia. straight bit. Clamp the workpiece between bench dogs, and use an edge guide on the router to make the cut (**Photo 2**). Cut each mortise in two or three passes to avoid overloading the router. After making each cut, use a sharp chisel to chop the mortise square (**Photo 3**).



2 Cut the post mortises before sawing the tapers. Use a plunge router or bore out the mortises on the drill press.

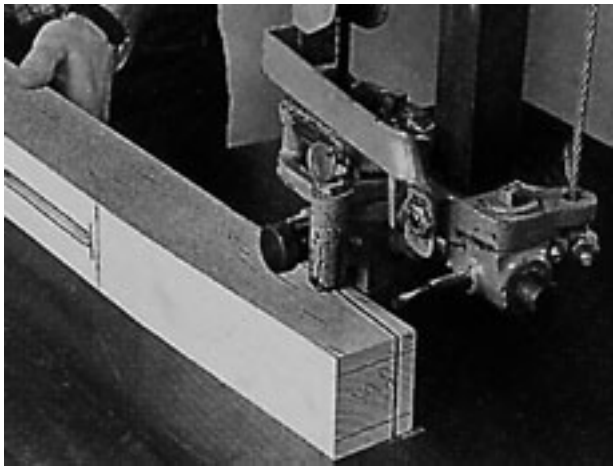
To make the bed easier to move, its joints are bolted together rather than glued. This construction requires that you bore a hole through the mortise bottoms and bore a matching hole into the tenons on the rails and headboard. Use the drill press to bore the 3/8-in.-dia. holes through the rail mortises and the 1/4-in.-dia. holes through the post mortises for the headboard.

Use the band saw to cut the tapers on each post. Note that the tapers are also marked on the posts' ends (**Photo 4**). Cut two tapers, then use the marks on the ends of the posts to draw the tapers on the newly sawed surfaces. Also, use a roller stand or have a second person help you when sawing the tapers. The posts are simply too long to saw without support. Use a sharp and finely set hand plane to smooth the cut surfaces and to refine the tapers (**Photo 5**).

Next, use a Forstner or multispur bit to counterbore the bolt holes on the outside surface of each post (**Photo 6**). Then use a countersink to recess the holes for the headboard screws.

Cut the 3/8-in.-wide chamfers along the tapered edges of each post using a chamfer bit in the router. The chamfers on the inside post corners run the length of the post, while the remaining chamfers are stopped just above the point where the rails join the post. Use a sharp plane or chisel to cut the chamfers at the top of each post.

3 Clamp the posts firmly to the bench, and chop the ends of the post mortises square using a sharp chisel.



4 Saw two tapers, then use the marks on the ends of the posts to redraw the tapers on the sawed surfaces.

5 Smooth the sawed surfaces and refine the taper with a hand plane. Set the plane to take a fine shaving.

6 Counterbore the bed bolt holes and headboard screwholes in the posts. Use a Forstner bit in the drill press.

The Headboard and Rails

Rip, crosscut and joint the stock for the headboard so it forms an oversize blank. Also rip, crosscut and joint the stock for the bed rails and the support rails.

Position the headboard stock so it forms a blank with the grain positioned attractively, then mark it for joining plate slots 6 in. to 8 in. on center along the mating board edges. Don't position a plate too close to the blank edge -- you might expose the plate when cutting the headboard to shape. Hold the headboard pieces firmly to a flat, clean worksurface, center the plate joiner on the mark and make the plunge cut (Photo 7).

7 Rip and crosscut the headboard stock oversize. Cut joining plate slots in the stock, then glue and clamp the stock.

Apply glue to the board edges, slots and the biscuits. Clamp the assembly, and when the glue sets, plane and scrape it smooth.

8 Saw the headboard tenons using a dado head on the table saw. The tenon width here requires great accuracy.

The headboard joins the two front posts with two tenons that run nearly the width of the headboard. To ensure tight-fitting joints, it's important that the headboard be perfectly rectangular. Crosscut the headboard blank on the radial-arm saw or table saw. With either machine, be sure you are making a square cut.

Cut the tenons on the ends of the headboard and on the bed rails using the dado blade in the table saw (Photo 8). The headboard and rails have shoulders on the top and bottom of the tenon. To cut the shoulders on the rails, readjust the blade height on the table saw, stand the rail on edge and cut the shoulder. The headboard shoulders are cut later with a handsaw.

Lay out the curved shape of the headboard, and make the cut with a sabre saw just to the outside of the line. Clamp

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the workpiece in a vise, and use a sharp and finely set plane and spokeshave to smooth the cut surfaces and work down to the line (Photo 9). Then mark the shoulders on the top and bottom edges of the headboard tenon, and make the cuts using a dovetail saw (Photo 10).

Next, using a router and chamfer bit, cut chamfers on the top edges of the bed rails and the top and bottom edges of the headboard.

Dry assemble the headboard and head rail to the posts. Clamp the subassembly, and use a long 3/8-in.-dia. bit to bore slowly through the post into the end of the rail tenons (Photo 11). Use a 1/4-in.-dia. bit for the headboard joints. Bore the other holes for each bolted joint.

Now, lay out and bore the pocket holes for the bed bolt nuts on the inside of the bed rails. Use a Forstner bit in the drill press to bore the holes, then use a chisel to square the sides of each hole, forming a flat surface on which the nut can bear (Photo 12).

Using the drill press, bore the 10mm-dia. holes for the cross dowels in the back of the headboard. To get the hole in a cross dowel aligned with the hole in the end of a tenon, poke a screw into the tenon and twist the cross dowel with a screwdriver so you can thread the screw into the cross dowel (Photo 13).

Rip and crosscut the poplar stock for the end support rails. Then, bore the access holes for the rail bolts. Remember to bore the holes so they are offset from those in the outer rails. When the two rails are joined, this allows better access to the rail nuts than if the holes were aligned.

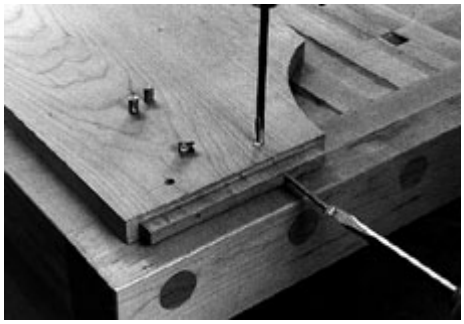
Cut the notches in the end support rails with a handsaw (Photo 14), and then chop the notches square with a chisel.

9 Saw the headboard to shape. Smooth away saw marks and refine the shape using a smooth plane and spokeshave.

10 With the headboard edges smoothed, mark and cut the shoulders at the top and bottom of the tenon.

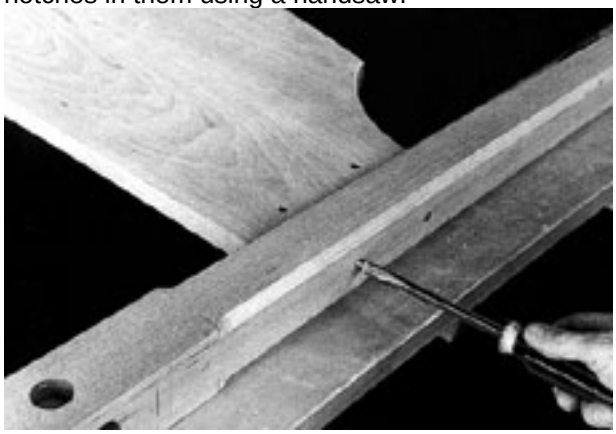
11 Use a long bit to bore slowly through the post holes and into the headboard and rail tenons.

12 Use a chisel to cut a flat surface into the hole on the side rails. The bed bolt nut bears on the flat surface.



13 Bore 10mm holes for cross dowels in the back of the headboard. Turn the dowel to align its hole with the screw.

14 Clamp the end support rails firmly together, and cut the cross support notches in them using a handsaw.



15 Fit the head rail and headboard between two posts. Drive screws through the posts and into the cross dowels.

Assembly

Bore and counterbore pilot holes through the poplar rails to screw them to the cherry rails. Bore a screwhole below the notches in the head and foot rails. Clamp the rails together, and drive screws through the holes. Screw the headboard to the posts (Photo 15), and use bed bolts to attach the head rail to the posts. Follow the same procedure for the foot rail and posts. Have an assistant help you bolt together the head and foot assemblies with the side rails. Tighten the bolts using a bed bolt wrench (Photo 16).

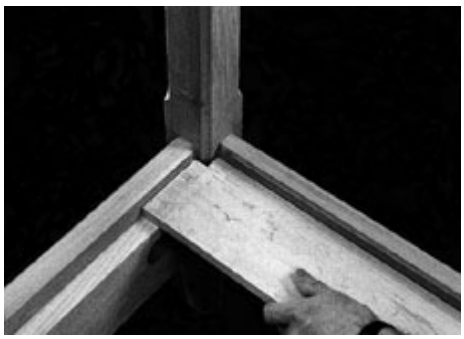
After the frame is assembled, install the cross supports by sliding each into its notches (Photo 17).

Rip and crosscut the maple bed slats, then cut the notches in the slats at the head and foot of the bed to fit around the posts (Photo 18). Bore and counterbore pilot holes in the slats, then use a 1/4-in.-rad. rounding-over bit mounted in a router table to cut the slats' edges. Screw the slats to the cross supports using 13/16-in. spacer blocks between each (Photo 19).

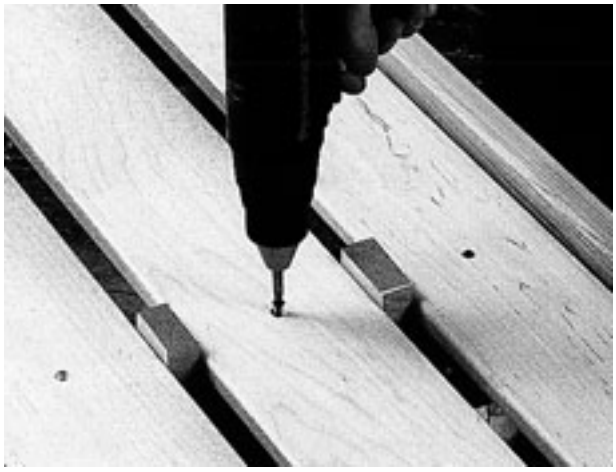
Disassemble the bed, and sand all parts with 220-grit sandpaper followed by 320-grit paper. Apply four coats of Watco Danish Oil Finish using a brush or rag, and let it soak in for 20 to 30 minutes, then wipe it off. Let the piece dry overnight between coats. After the final coat has dried, rub it smooth with 4/0 steel wool. The maple slats need no finish, but a coat of varnish seals them.
Reassemble the bed and nail the bed bolt covers in place. Each cover should be loose enough to swivel.

16 Use a bed bolt wrench and an open-end wrench to tighten the connection between the rails and posts.

17 Prepare for installing the slats by fitting the cross supports into the notches that are cut in the end support rails.



18 Cut the slat stock. Cut notches in the slats at the foot and at the head of the bed so they fit around the posts.



19 Position 13/16-in.-wide spacer blocks between the slats, and screw the slats to the cross supports.

QUILT RACK

Materials:

- Lumber of your choice sufficient for the pieces listed in the quilt rack dimensions
- Wood screws: 8 flat-head wood screws #6 x 1 1/2"; 4 flathead wood screws #6 x1"
- 3/8" wooden pegs
- Assorted grit sandpaper
- Finishing materials

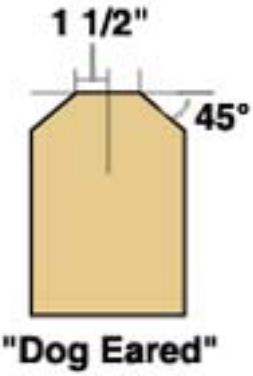
Quilt Rack Dimensions

These dimensions may be altered slightly, but keep in mind that drastic alterations may not work. For example, a quilt rack that is too tall may be top-heavy and likely to topple over.

The quilt rack is made up of eight simple components.

- 2 stiles— 1" x 8" x 32" each. (The main vertical uprights that frame the piece.)
- 4 horizontal cross members— 1" x 2" x 26" each. (3 at the top as hangers for the quilt and one at the bottom as a brace. The inside measurement from stile to stile is 26")
- 2 horizontal feet— 1" x 2" x 10" each. (These are secured to the bottom of the stiles and help stabilize the rack.)

Shaping



Now that the eight pieces are sized, it's time to put the final touches on four of them before assembly.

- Let's start with the feet. Using your power miter saw or miter box, trim the ends of each 1" x 2" x 10" piece at a 45° angle. The angles slant toward each other at the top of each foot.
- Choose the particular cut you want for the top of the stiles. You can use a rounded-top cut, which will require a band saw, jigsaw or scroll saw, or select a simple dog-eared cut. For a rounded-top stile, mark the piece for the round cut by locating and marking the width center. Make another mark the same distance from the top. Use a compass to scribe the curve from the marked center point.
- For a dog-eared look, determine the center of the top edge of one of the 1" x 8" x 32" stiles. From that center point, measure 1 1/2" out on each side. You now have the middle 3" of the top edge of the stile. From each side of that 3" mark, use a combination square and pencil to mark a 45° angle to the long, vertical side of the stile. After you mark and cut one stile, you may use it as a pattern for the second. Place the ends of the pieces against a stationary, vertical surface in order to ensure two equal pieces when cut.

Drilling and Assembling

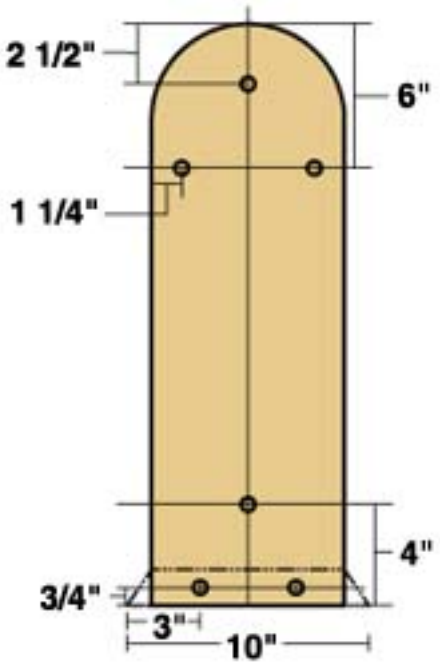
1. First, use a square and pencil to transfer the center mark at the top of the stiles down about 7" on the outside face parallel with the long edges. Determine the side to face out by choosing the most favorable wood grain.

2. Make a mark perpendicular to the first mark 6" from the top all the way across the stile to form an upside-down "T." Make certain that the respective marks are parallel to the top and sides of the stile since the "T" will determine where you will drill the holes for the recessed screws.

3. Measure and mark the spot for each hole, as described below, making a small pencil mark across the respective lines of the "T." The three spots where the lines intersect will mark the centers of your holes.

    - The first hole, which will hold the screw for the top cross member, will be 2 1/2" from the top of the stile, centered on the 7" pencil mark.

    - The other two holes will be located 1 1/4" from each outside edge of the stiles, intersecting the pencil mark running across the piece.



Drill holes as indicated in the drawing.

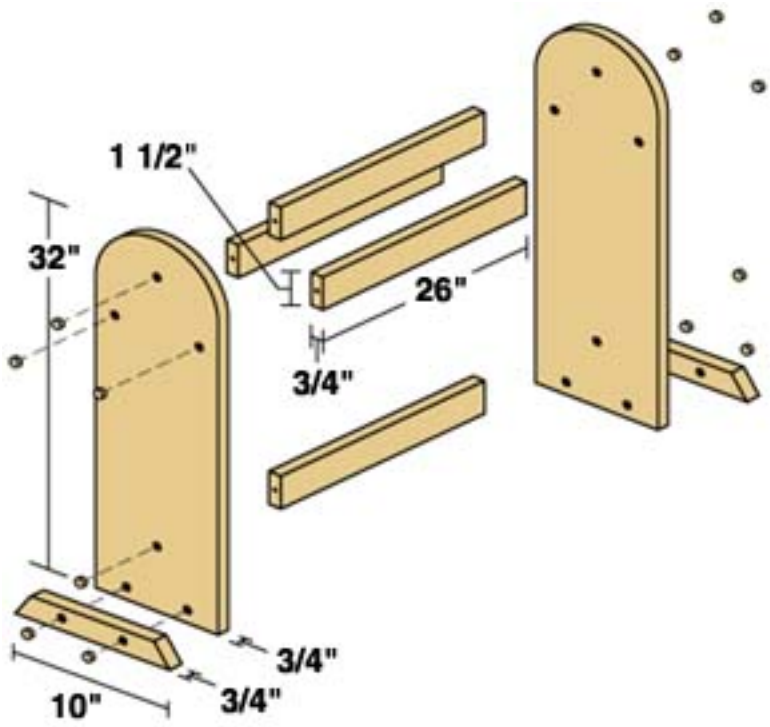
4. For the bottom cross member, which serves primarily as a brace, determine the center point of the stile at the bottom and use a light pencil mark to transfer that point 5" up. Then measure 4" from the bottom, making a small pencil mark across the previous 5" mark. That will be the spot for your bottom brace.

5.

6. Once you have marked one of the stiles, lay it down on a flat, smooth surface. The marks you just made are for countersink holes for the screws that will hold the piece together, so they need to be just 1/4" deep.

7. Now that the countersink holes are drilled, drill pilot holes for the screws. Use a 1/16" twist bit to drill through the center of the countersink holes and all the way through the stiles.

8. After drilling the pilot holes in the stiles, do the same in both ends of each 26" cross member: Determine the center of each end by marking diagonal lines from corner to corner. The intersection of the lines will be the center point. Now drill pilot holes approximately 1/4" deep, using the same 1/16" twist bit used on the stiles.



Exploded view of the quilt rack.

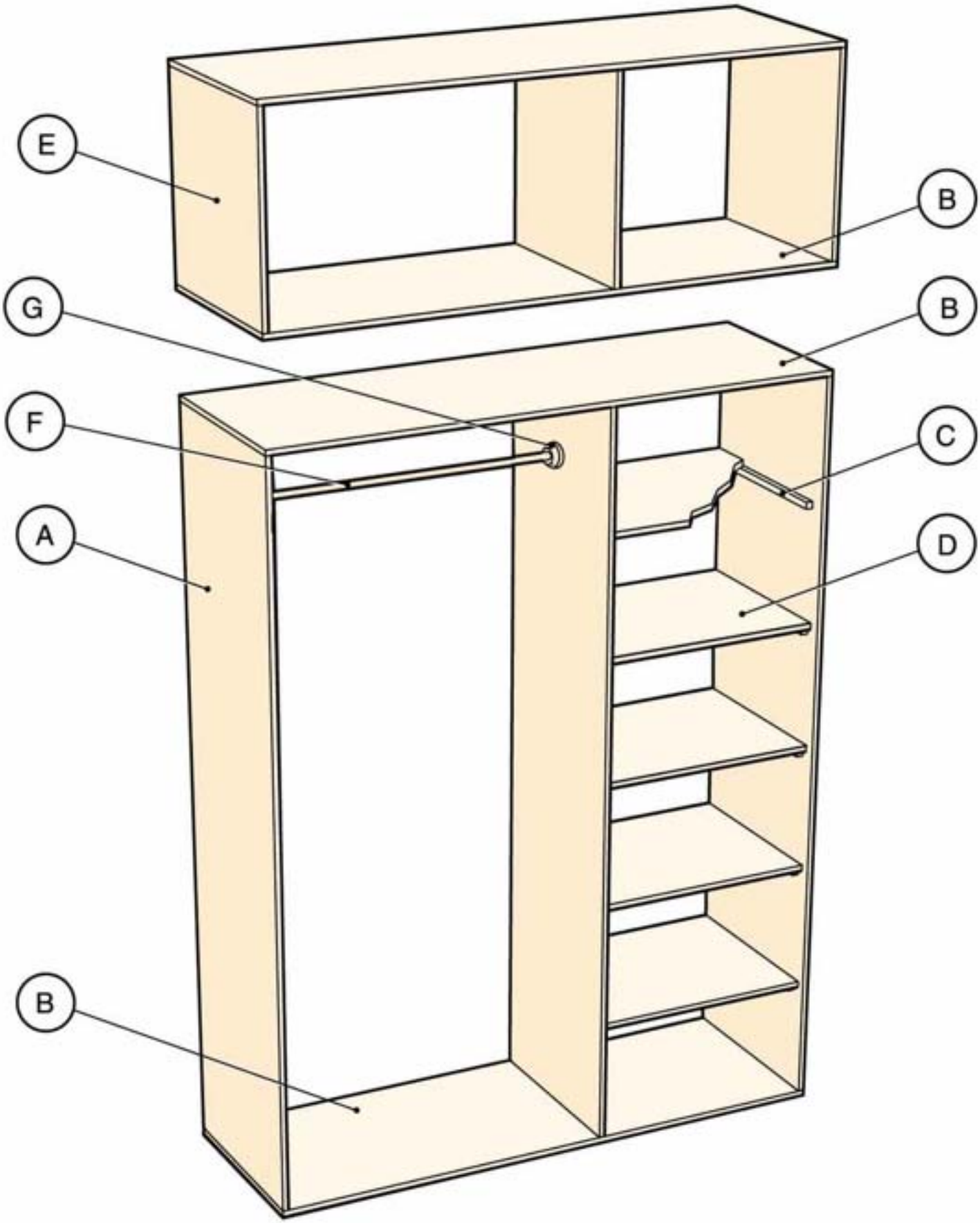
Assembly

1. Start with the top cross member. Place a screw in the top recessed hole of one of the stiles and, using a Phillips screwdriver, turn the screw into the pilot hole until the tip begins to emerge on the other side. Now place one of the cross members against the screw tip, align the pilot hole, and turn the screw into the wood. Repeat for the other stile. Continue until you have put all of the cross members, including the bottom brace, in place. Be sure not to overtighten, so that you can adjust the cross members if needed.

2. After installing the cross members, measure 3" from each end of both "feet." Then measure up from those points about 3/4" (approximately to the center) of the feet. If everything fits together properly and is correctly adjusted, tighten all screws.

Assembled view of the quilt rack.

OPEN WARDROBE



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You'll need:
Materials

Item	Part	Size	Material
A	Tall sides/divider (3)	2068 x 550 x 16mm	Melamine board
B	Bases/tops (4)	1630 x 550 x 16mm	Melamine board
C	Cleats (10)	19 x 19 x 500mm	pine
D	Shelves (5)	632 x 540 x 16mm	Melamine board
E	Short sides/divider (3)	518 x 550 x 16mm	Melamine board
F	Hanging rail	940 x 19mm diameter	chrome steel rod
G	Rod sockets (2)	19 internal diameter	chrome steel
H	Trim – optional (total)	19 x 19 x 7200mm	pine/maple

You'll also need contact adhesive for gluing, 30mm and 45mm cross-head screws, wet & dry sandpaper and white snap caps. Standard, 16mm thick x 600mm wide, Melamine-coated particleboard shelving is available in sheet lengths of 1.8m and 2.4m. Our unit used 8 x 2.4m sheets.

Here's how:
1. The crucial measurements are the opening where the unit will be built and the size of the chest of drawers you will use. Often walls aren't quite square, so subtract about 20mm all around – this also allows for the thickness of skirtings. Leave enough space above the chest of drawers to hang clothes. We made our unit in two sections for easy installation in a room with a ceiling height of 2.7m. Our two units were 2100mm and 550mm high, by 1630mm wide and 550mm deep, with an opening of 950mm for the drawers.

2. Cut the three tall sides **(A)** and a base **(B)**. Use a power saw for the cuts, setting the blade just deep enough to cut the panels. Work with the good side (the one most likely to be seen) face down, as there is likely to be some minor chipping of the Melamine on the saw side.

3. To fix bottom and top to two sides, pre-drill for four screws per joint and countersink for the screw heads. Working with panels on their back edge, apply a small amount of contact adhesive, then screw together, making sure front edges are flush. It's best to get someone to help hold the panels.

4. From the inside edge of one side, measure 950mm along the top and bottom of carcass. Square a line across the board and use this as a guide to pre-drill and countersink the top and bottom. Glue and screw divider in place.

5. From the top, measure down both sides of the narrow opening at increments of 346mm – that is, 346mm, 692mm, 1038mm, 1384mm and 1730mm. Square a line from the back to within 50mm of the front. Cut the cleats **(C)** with an optional 45° mitre on the front ends, and paint them to match if you wish. Glue and screw the cleats to the sides with the top edges on the lines and the back flush with the rear of the panels. Use the shorter 30mm screws.

6. Cut the shelving **(D)** to suit. Ours is set back 10mm from the front. After pre-drilling, screw shelves to battens with two 30mm screws per cleat.

7. Get help to stand the unit in place – it will be quite floppy - and check the fit. Check with the spirit level to make sure the sides are vertical. Measure the gaps between the sides and the wall; measure the wall in three places and mark these positions. Lay down the unit, and cut offcuts of shelving or plywood to make up the thickness of packing required, and nail to wall studs or plug into masonry. Carefully slide the unit back in

place and screw the sides into the packers to hold it in place.

8. Make the top unit the same way as the bottom one by screwing the top and bottom **(B)** to the sides and the divider **(E)**. Fit packing pieces to the wall near where the top of the unit will be, then slide the unit in place. Screw the top unit into the top of the bottom one with 30mm screws, as well as to the packers.

9. Cut the chrome hanging rail **(F)** with a hacksaw so it fits the wide opening. Smooth the ends with wet & dry sandpaper and loosely fit on the rod sockets **(G)**. Centre and space the rail from the underside of the top to allow easy removal of clothes hangers and mark screw holes at both ends. Pre-drill holes for the sockets, then install with screws provided. Finish off by pressing small snap caps into any exposed screw heads. Slide in the chest of drawers and your open robe is finished.

KITCHEN BASE CABINET

There are two sorts of kitchen cabinets: base cabinets, which sit on the floor, and wall cabinets. Base cabinets provide both storage space and work surfaces. They often house sinks, such large appliances as dishwashers, and sometimes smaller conveniences, such as slide-out shelves or cutting boards.

Construction: The basic cabinet is made of a plywood case (sides, floor, and back) and a counter top covered with plastic laminate. Hardwood trim defines

Parts list

Part	Name	Quantity	Thickness	Width	Length	Material
A	Right (wall) side	1	¾"	22½"	31"	Birch plywood
B	Left (outer) side	1	¾"	23¼"	35¼"	Cherry plywood
C	Divider	1	¾"	22¼"	31"	Birch plywood
D	Cabinet floor	1	¾"	22½"	46½"	Birch plywood
E	Shelf	1	¾"	8"	22⅞"	Birch plywood
F	Drawer side	6	½"	4½"	22"	Birch plywood
G	Drawer side	4	½"	8"	22"	Birch plywood
H	Drawer front and back	4	½"	8"	21"✲	Birch plywood
I	Drawer front and back	6	½"	4½"	21"✲	Birch plywood
J	Drawer bottom	2	¼"	20⅞"✲	21"✲	Birch plywood
K	Drawer bottom	3	¼"	20⅞"✲	21"✲	Birch plywood
L	Back	1	¼"	31¾"	46¾"	Birch plywood
M	Door panel	1	¼"	19⅝"	21⅞"	Cherry plywood
N	Drawer face	2	13/16"	9⅜"	23"	4/4 cherry
O	Drawer face	3	13/16"	5⅞"	23"	4/4 cherry
P	Kickplate	1	13/16"	3½"	48"✲	4/4 cherry
Q	Trim	9	13/16"	1¼"	†	4/4 cherry
R	Door stile	2	13/16"	2"	25⅛"	4/4 cherry
S	Door rail	2	13/16"	2"	20½"	4/4 cherry
T	Door panel clip	4	⅜"	13/16"	⅞"	4/4 cherry
U	Plug	24	⅜" dia.	—	¼"	4/4 cherry
V	Bracing strip	2	¾"	1½"	45½"	1 x 2 pine
W	Bracing strip	2	¾"	1½"	19½"	1 x 2 pine
X	Batting strip	1	½"	½"	72"✲	1 x 2 pine
Y	Batting strip	1	½"	½"	24½"✲	1 x 2 pine
Z	Platform beam	2	1½"	3½"	46¾"	2 x 4 fir
AA	Platform beam	2	1½"	3½"	16"	2 x 4 fir
BB	Counter top	1	¾"	25"✲	73"✲	Particle board
CC	Backsplash (optional)	1	¾"	18"✲	73"✲	Particle board

✲Measurement is approximate; cut to fit during construction.
†One piece 30¼" long for divider; one 22⅞" long for shelf; and two 22⅜" long, two 32¼" long, and three 45½" long for cabinet face. Check measurements before cutting.

Tools and materials: Radial arm or table saw with dado head Saber saw, backsaw. Router with straight veneer trimmer, bevel veneer cutter, arbor, and pilot, 3/8" rabbeting bit, and 45° chamfer bit. Electric drill with set of twist bits, No. 10 plug cutter, and Nos. 8 and 10 combination pilot, clearance, and Counterbore bits. Wide chisel, 3/16" chisel, fine laminate file Hammer screwdriver. Several 5' pipe or bar clamps, several 6" C-clamps, vise. Framing square, combination square, level, steel tape rule, compass, utility knife, pencil. Rubber-surfaced pressure roller or rolling pin Belt sander with No. 120 sanding belt Nos 80, 100, 150, and 220 sandpaper. Masking tape, carpenter's glue, construction adhesive, contact cement Lacquer thinner or equivalent solvent, tung oil, soft cloths One 4' x 8' panel each of 1/4", 1/2", and 3/4" birch-veneer lumber-core plywood and of 3/4" high-density particle board. One 2' x 4' panel each of 1/4" and 3/4" cherry-veneer lumber-core plywood, 48' of 4/4 cherry, 20' of 1 x 2 clear pine, and 11' of 2 x 4 fir Cedar shingles. Enough 1/16" plastic laminate to cover surface and edges of counter top Two flush-mounted pivot hinges, five pairs of 20" metal drawer slides, one magnetic door catch, six small round drawer/door pulls. 2d, 3d, 4d, 8d, and 12d common nails, 4d and 6d finishing nails, 7/8" No 6 roundhead wood screws and the following flathead wood screws: 5/8" No 4, 1/2" No 6 1", 1 1/2", and 2" No 8, and 1 1/4" No 10

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the openings for the door and drawers and reinforces the case. The case is fastened to a platform that has been leveled with tapered shingles used as shims.

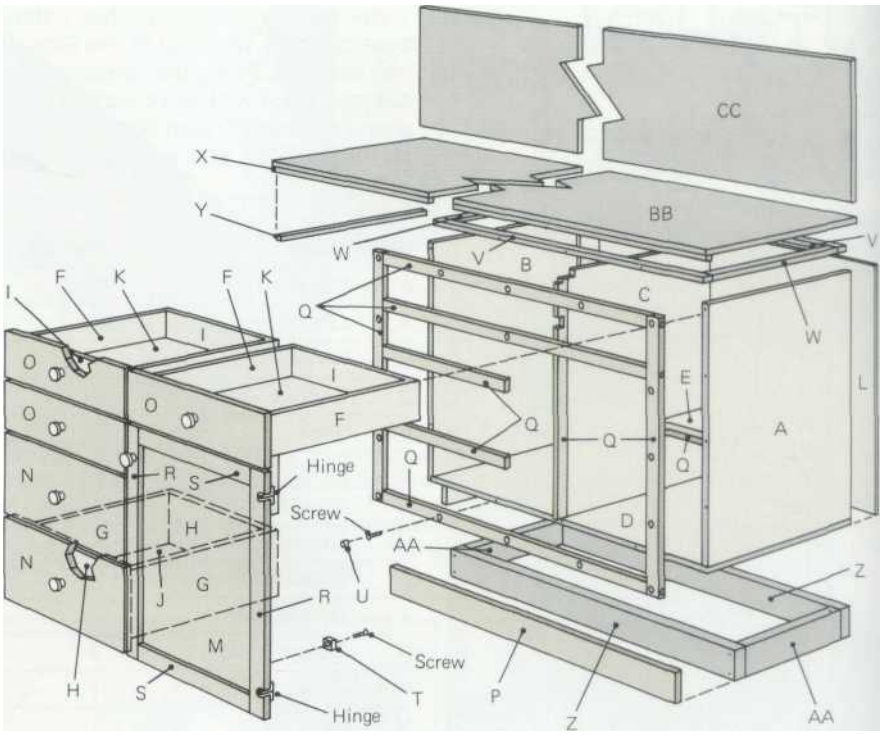
Do-it-yourselfers who build kitchen cabinets often order custom-made counter tops. It is a good idea to do so if you need a large or L-shaped top. Otherwise, you can make your own as shown and save a good deal of money.

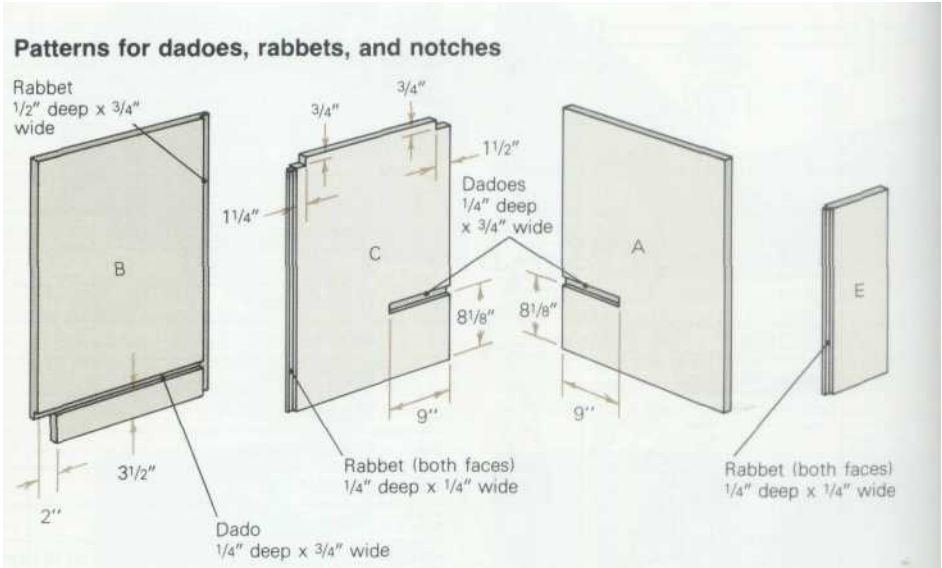
Variations: The base cabinet described in this project has five drawers and a wood-paneled door that opens to reveal a shallow fixed shelf. You can easily rearrange, increase, or eliminate the elements to suit your needs. . You can also redesign the cabinet to house a sink.

The directions that follow are for a cabinet 3 feet high and 2 feet deep that will fit beneath the kitchen wall cabinet in the next project. The counter top is designed to cover not only the cabinet but a dishwasher or other appliance as well. You can build the base cabinet exactly as it is shown here if you wish, but you will have to adapt at least the length of the counter top to fit your own kitchen.

A base cabinet has two types of sides. One side (the right, as described in the directions that follow) reaches only to the cabinet floor, which rests on top of a platform. It should be placed against a wall or butt against another cabinet on a common platform. The other side (the left) reaches all the way to the kitchen floor, masking the platform. It should be placed against a large appliance or be left exposed. If it is exposed, use cherry-veneer plywood and fill the screw holes with cherry plugs as used on the face of the cabinet. If the left side of the cabinet will not be seen, use less-expensive birch plywood and leave out the plugs. If both sides of your cabinet will be visible, use the measurements, techniques, and materials given for the left (outer) side for both sides of your cabinet. If both sides butt against walls or other cabinets, use only the measurements, techniques, and materials shown for the right (wall) side.

You may want to install a backsplash, which will prevent liquids from running off the counter top and down the wall. Although a short backsplash is equal to the task, the 18-inch-high backsplash recommended is easier to keep clean and provides a level support for a wall cabinet. If you plan to install a wall cabinet above your base cabinet, a high backsplash will make the job easier.





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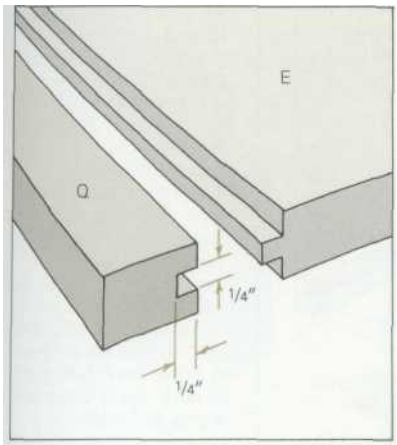
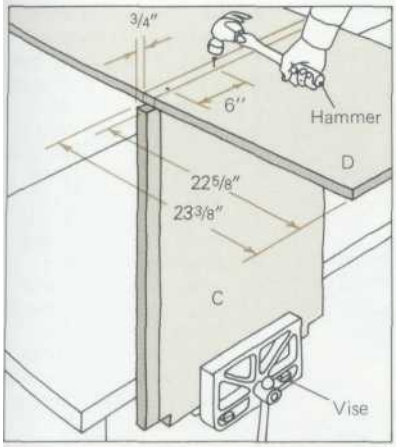
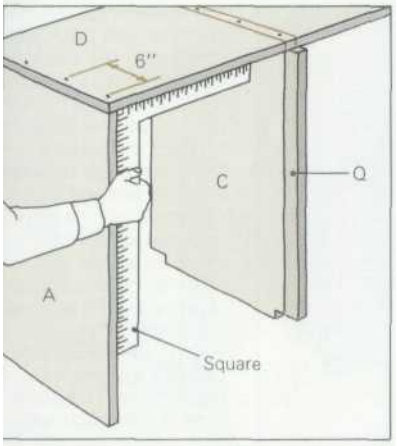


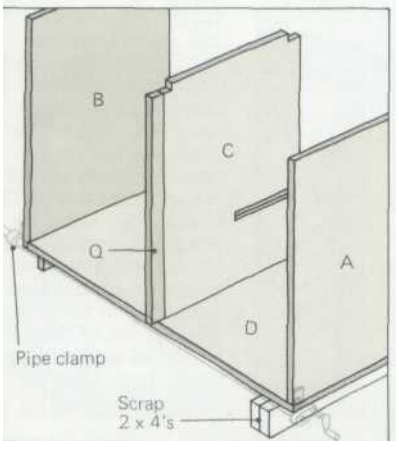
1. Cut parts A-E to sizes in chart Then cut dadoes, rabbets, and notches shown in patterns Cut trim (Q) for divider (C) and shelf (E) and cut a *1/4*- x 1/4-in. dado down center of back edge of each trim piece. Apply glue to dadoes, push trim onto tongues created by rabbets in divider and shelf. Clamp until dry. Belt-sand trim flush with divider and shelf.



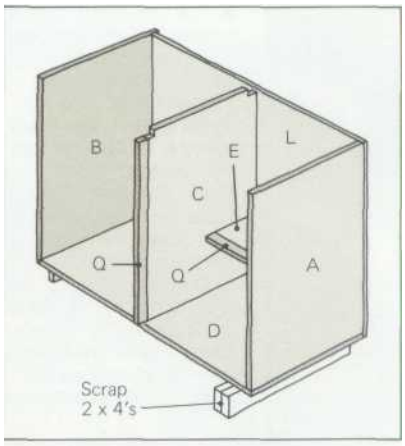
2. Draw lines across top of cabinet floor (D) 22 5/8 and 23 3/8 in. from left edge. Continue lines on bottom of floor Clamp divider (C) upside down in vise and glue floor to its bottom edge so that divider meets floor between lines and divider trim extends 3/4 in beyond front of floor. Using lines on bottom of floor as guide, drive 4d common nails through floor into bottom of divider every 6 in. Keep connection squared while doing so.



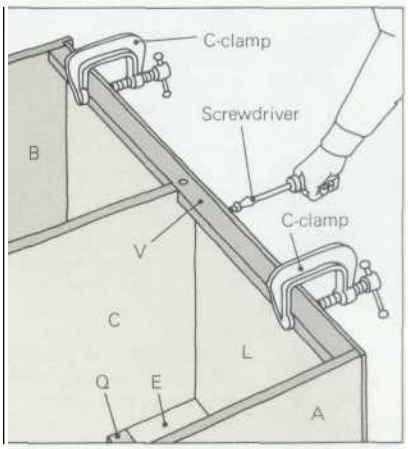
3. Apply glue to bottom edge of right cabinet side (A) and set cabinet floor (D) upside down on top of it so that all outer edges of the two pieces are flush. Drive 4d common nails through cabinet floor into bottom edge of side every 6 in., stopping to check for squareness after driving in each nail. It is of utmost importance that the cabinet be square, as the smooth operation of the drawers and door will depend upon it.



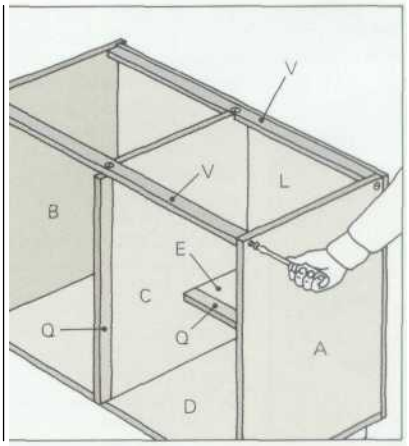
4. Turn assembly right side up Apply glue to long horizontal dado in left cabinet side (B) and insert left edge of cabinet floor into it so that front edges of floor and side are flush. Clamp unit and prop up opposite side of cabinet floor with two scrap 2 x 4's set on edge so that cabinet will sit level until the glue dries.



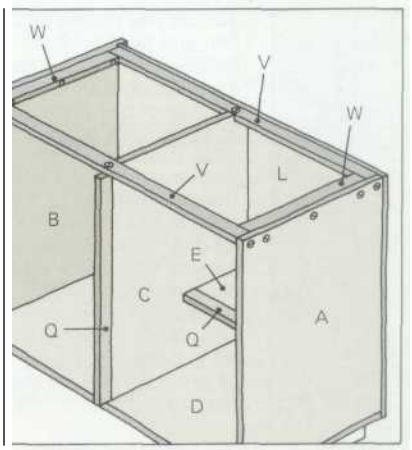
5. Slide shelf (E), with its trim facing the front, into dadoes in divider (C) and right side (A) Cut back (L) to size and glue it in place so that it sits in rabbet in left side and is flush with bottom of cabinet floor (D) and outer edge of right side Tongue of left side will extend a bit beyond back Secure back with 4d common nails.



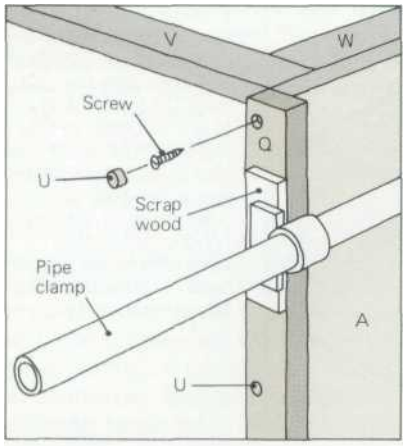
6. Check measurement and cut long bracing strips (V) to size. Clamp one strip along inside of back (L), fitting it into notch at top of divider (C) so that its ends touch insides of cabinet sides (A and B) Use No. 8 combination bit to drill five evenly spaced pilot holes through back into bracing strip Also drill down through bracing strip into top of divider. Drive in 1 1/2**-in.** No 8 screws and remove clamps



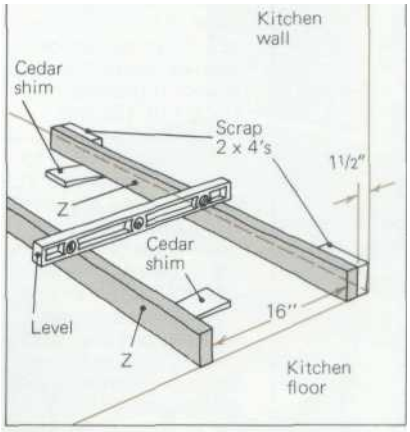
7. Fit other long bracing strip (V) into notch at front of divider so that its ends are flush with tops and fronts of cabinet sides. (Trim on divider will protrude 3/4 in. at front) Use No 8 bit to drill through front bracing strip into divider and drive in a 1 1/2-in No 8 screw. Drill one hole through each side into each end of each long bracing strip and drive 2-in No 8 screws into the holes



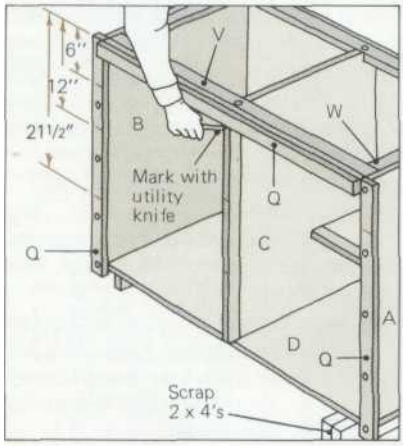
8. Check measurement and cut short bracing strips (W). Clamp one strip against inside of right cabinet side (A) with its ends butting long bracing strips (V). Use No, 8 combination bit to drill three holes through cabinet side into short bracing strip. Clamp other strip to left side. This time, drill pilot holes through strip into side Attach strips with 2-in No 8 screws. Sand inside of cabinet with Nos. 80, 100, 150, and 220 paper



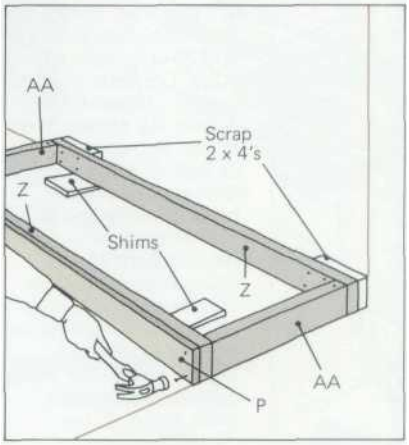
9. Cut trim (Q) for front edges of cabinet sides, and clamp trim flush with inner edges and tops of sides. Use No. 10 bit to drill pilot holes every 8 in. through trim into front edges of sides. Counterbore holes % in. deep. Glue and screw trim in place. Remove clamps when glue is dry. Use No. 10 plug cutter to cut plugs (U) from cherry Glue plugs into screw holes, and chisel and sand their tops flush with trim.



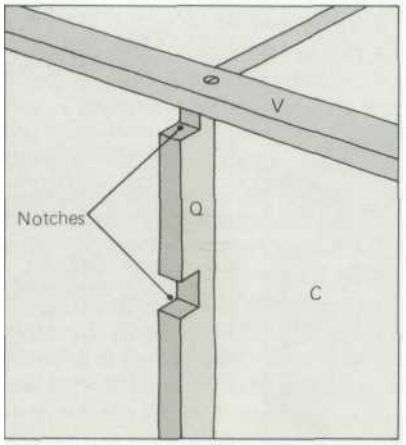
13. Cut platform beams (Z and AA) to size Position one long beam parallel to wall and 1 1/2 in from it Put two short 2 x 4 scraps into gap to maintain spacing and serve as nailing surfaces. Position other long beam parallel to first and 16 in away Level each beam, if necessary, by pushing a cedar shingle under it as far as needed. Level beams with each other in same way, being sure to keep each beam level along its length



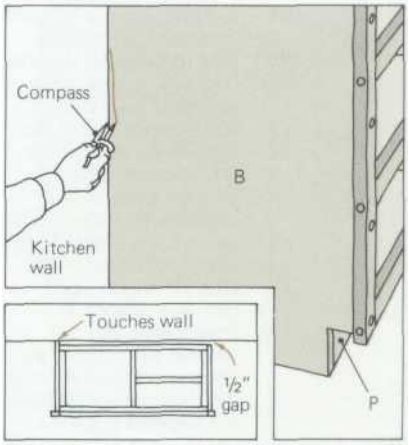
10. Mark trim on cabinet sides 6 in. from top. Mark trim on divider and left side 12 in. and 21 1/2 in. from top. Cut a piece of trim and position it across cabinet front flush with tops of trim on sides. Use a knife to mark divider where trim crosses it. Cut and position a second piece of trim with top edge at 6-in mark and a third piece with top edge flush with top of cabinet floor. Mark divider where these pieces cross it.



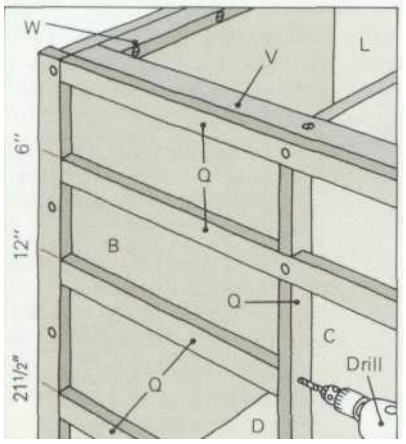
14. Position the short beams (AA) between ends of long ones Level short beams, then level all beams with each other Use 12d nails to toenail the 2 x 4 scraps to wall, face-nail inner long beam to scraps, toenail short beams to inner long beam, and face-nail outer long beam to short beams. Also toenail each piece to kitchen floor Cut kickplate (P), and nail it flush with top of outside beam with 6d finishing nails every 10 in



11. Use saber saw to cut ^{13}/16-in.-deep notches in divider trim where horizontal trim will hit it, using knife marks as guides. With No. 10 bit drill a deep hole through each piece of trim into divider. Glue and screw trim to divider Drill pilot holes and glue and screw top trim to bracing and bottom trim to cabinet floor. Plug all holes. Use No 8 bit to drill through trim on sides into ends of horizontal trim. Drive in 2-in. screws



15. Position cabinet on platform with back edge of left side (B) touching wall and cabinet back (L) 1/2 in. from wall Front of cabinet should be 2 3/4 in from kickplate If there are gaps between left side and wall, set a compass with its point and pencil as wide apart as widest gap Draw point of compass down wall so that pencil will mark contours of wall on left side. Plane or sand away wood behind marks to make side fit flush with wall.



12. Cut two pieces of trim and position them between trim on divider and left cabinet side so that top of one piece is at 12-in. mark and top of other piece is at 21 1/2-in. mark made in Step 10 Use No. 10 bit to drill holes through trim on divider and on left cabinet side into ends of short horizontal trim. Drive in No. 10 screws. Use router with chamfer bit to bevel any edges of trim that will face the door or a drawer.

16. Drive 8d nails through cabinet floor into platform every 10 in Using dimensions in chart on page 115 for parts F-K, make three small and two large drawers To do so, cut drawer faces (N and O) to size, then follow the directions for making drawers in platform bed, but skip Steps 16-18 and use 20-in. slides instead of the larger ones required for the bed Sand and set aside drawers

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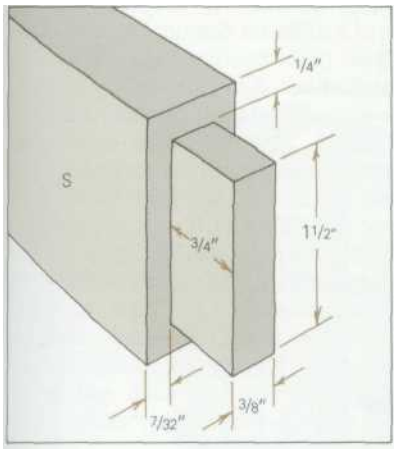
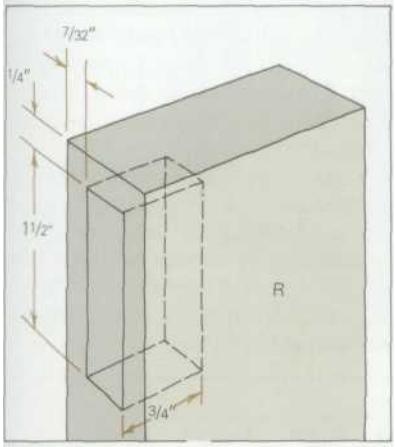
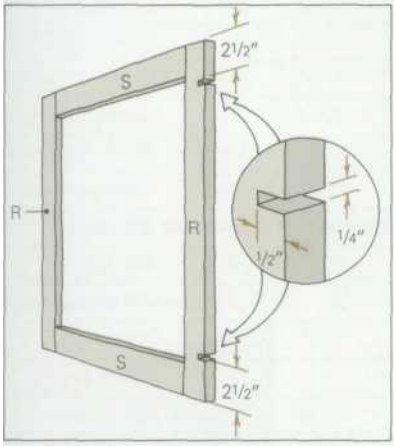


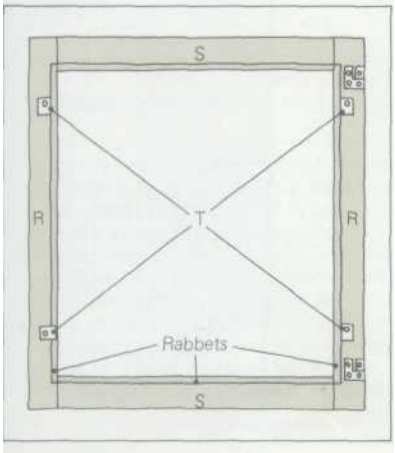
17. Cut door stiles (R) and rails (S) to size. Mark off both ends of both rails for tenons. Each tenon should be 3/4 in. long, 3/8in. thick, and 1 1/2 in. wide, and have four shoulders. The long shoulders should be 7/32 in. wide and the short shoulders should be 1/4 in. wide as shown. Use table or radial arm saw with dado head to cut the tenons.



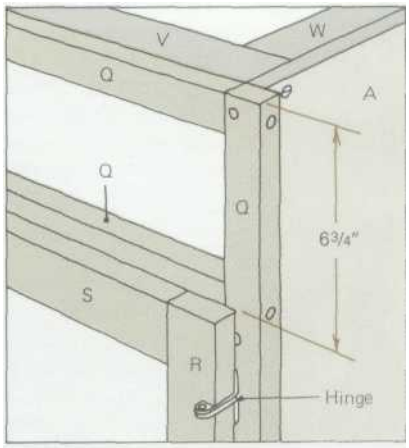
18. Draw cutting lines for mortises on door stiles (R) 1/4 and 1 3/4 in.
from each end of each stile and 7/32 in. from each side edge Test-fit door-rail tenons inside the lines. Cut blind mortises 3/4 in. deep. Glue together, clamp, and square off door frame. When glue is dry, unclamp frame and make rabbets 3/8 in. wide and 1/4 in deep along inside perimeter of door frame to accept panel. Chisel corners of rabbets square



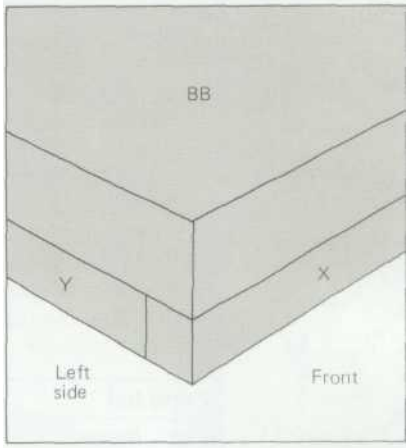
19. Sand door frame with Nos. 80, 100, 150, and 220 paper Cut two slots on outside face of one door stile, each vi in. wide and 1/2 in. deep. Position one slot 2 1/2 in. from top of stile and other slot 2 1/2 in. from bottom. Set hinges into these slots and use pencil to mark positions of hinge screw holes Drill pilot holes, and screw hinges to stile



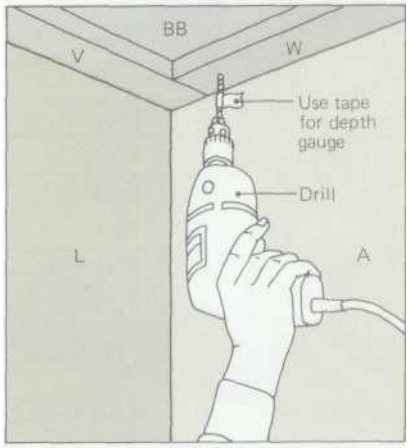
20. Cut door panel clips (T) and drill a 1/8-in. hole 3/16 in from one end of each. Sand clips and position them on inside of door frame so that when screwed on they can be turned one way to cover rabbets and the other to leave rabbets unobstructed. Mark clip holes on frame, drill 5/64-in. pilot holes, and attach clips to frame with No 6 roundhead screws, but leave screws loose enough that clips can be turned.



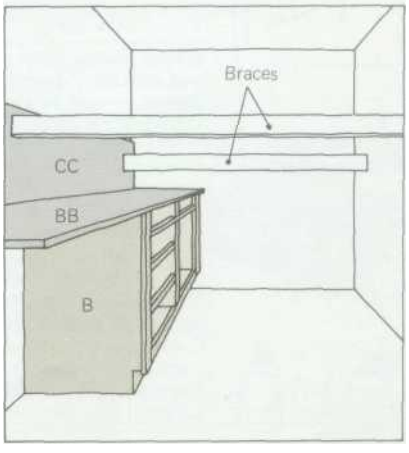
21. Cut door panel (M) to size and test its fit in frame. Trim it to fit if necessary, then sand it. Remove panel and hold frame against cabinet face with rabbets facing in and hinges at right Top edge of frame should be 6 3/4 in. below
top edge of cabinet. Level door frame, then mark cabinet with location of screw holes in hinges. Remove door frame and drill holes for hinge screws. Secure panel in frame, but do not install door yet



22. Cut counter top (BB) and batting strips (X and Y) to size. Attach batting strips to underside of counter top, flush with its front and side edges, with glue and 3d common nails Cut plastic laminate for top surface and exposed edges of counter top, allowing for 1/4-in. overhang on all sides. Apply laminate to side edge, front edge, and then top surface of counter top. Trim each piece and bevel edges



23. Position counter top on cabinet with its long batting strip overhanging cabinet front and its right side flush against wall. Use No 8 bit to drill up through bracing (V and W) into counter top in each corner (Do not drill deeper than 1 1/8 in. or you may pierce top.) Drive in 1 1/4-in screws Sand exterior of cabinet, then rub down wood with tung oil. Attach drawer/door pulls; install door, door catch, and drawers.



24. If you are installing a backsplash (CC). cut it to size and apply plastic laminate to edges that will show, then to front Test-fit backsplash on wall If there are gaps, trim as in Step 15. Glue backsplash to wall with construction adhesive If possible, brace it with lumber wedged against opposite wall until adhesive dries. Drill pilot holes and drive 2-in screws through bottom of the counter top into bottom of the backsplash

CHERRY END TABLE

Time-honored techniques of hand joinery, executed with the help of modern tools and equipment, make this a project any craftsman can be proud of. Whether your decor is stark contemporary or cozy Early American, this end table's clean, elegant lines, highlighted by the rich tones and delicate figuring of oiled cherry, will fit right in.

Wood: For the greatest economy and the best results in matching color and figure, try to find a single piece of cherry stock that will yield all the solid parts of the table. Brush a little paint thinner on the surface to get an idea of the color and figure—it will dry harmlessly—then look for a matching piece of cherry-veneer plywood for the shelf.

With careful cutting, you can get all the solid pieces from a board that is 2 inches thick, 6/2 inches wide, and 10 1/2 feet long. First, cut a 32-inch length and rip it into two 3-inch widths for the legs . Then cut a 6-inch length and rip it into four 1 /4-inch widths for the wings (B), Cut three 20-inch lengths for the top. Rip the remainder into 2 1/2-inch widths for the aprons (C and D), then rip these pieces to a thickness of 1 *'1/4*inches. The edging (E and F) and screw blocks (H) can be made from the scrap.

Construction: The table is built in three clearly defined phases, each of which is shown on a separate page. First, the legs, wings, and aprons are cut roughly to shape and jointed to make the basic table structure . Then these parts are more carefully shaped, the shelf is fitted into notches in the legs, and the structure is assembled with glue , Finally, the top is formed and joined to the structure by means of slotted screw blocks . Because of the inevitable imprecision of mortise-and-tenon joints, i both the shelf and the top should be cut and shaped to fit the assembled leg-and-apron structure—not cut according to predetermined dimensions

It may be difficult to find 2-inch-thick boards wide enough to make the legs according to the diagram on the opposite page (Step 1). If so, you can cut all four legs 1 3/4 inches square and 24 7/8 inches long and join two wings to each, rather than one as we have done, in order to make the corner units. When rough-cutting the curved part of the tapered legs (Step 3, opposite page), guard against accidents by first making a series of parallel cuts about 1/4 inch apart. If you use a band saw for the job, tape a piece of scrap wood to the lower part of the leg, as shown in Step 3, just thick enough to keep the piece level on the saw table.

Finishing: After construction is completed, use a block plane or spokeshave to gently round all sharp edges—how much you round them is a matter of personal taste and esthetic judgment. Then sand with Nos, 100, 150, and 220 sandpaper to achieve a smooth surface. To bring out the natural color and figure of the wood, apply several coats of penetrating oil, such as linseed oil, tung oil, or a commercially prepared Danish-style natural finish. If you want a protective, glossy surface, wait about a week before rubbing in a coat of wax.

Parts list

Part	Name	Quantity	Thickness	Width	Length	Material
A	Leg	4	1¾"	3"✲	24⅞"	Cherry
B	Wing	4	1¾"	1¼"	8"✲	Cherry
C	Side apron	2	1"	2½"	14"	Cherry
D	End apron	2	1"	2½"	12"	Cherry
E	Side edging	2	½"	⅞"✲	16"✲	Cherry
F	End edging	2	½"	⅞"✲	14"✲	Cherry
G	Top	1	1⅜"	16½"	18½"	Cherry
H	Screw block	10	⅝"	1"	1½"	Cherry
I	Shelf	1	¾"	12⅞"✲	14⅞"✲	A–2 cherry plywood

✲Measurement is approximate; cut to fit during construction.

Tools and materials: Table saw with combination blade. Band saw. saber saw, or coping saw. Backsaw, miter box. Drill with 3/32", 11/64", and 5/16" twist bits. Framing and combination squares, T bevel, steel tape rule, marking gauge, mortising gauge (optional), pencil. Awl, mat knife. Screwdriver. Jack plane, block plane, shoulder plane (optional), spokeshave or drawknife. Straight chisels: 1/8", 3/8", 1/2*", 3/4*", 1", and 1 1/2*".* Mallet. Six 3' bar or pipe clamps, several assorted C-clamps. Orbital sander (optional), sanding block. Nos. 80, 100, 150, and 220 sandpaper Yellow carpenter's glue, penetrating oil. Wax (optional). Wax paper, heavy paper. 3/16*"* washers, 1 1/4" and 1 1/2" No, 8 roundhead screws. A 2" x 6 1/2" x 10 1/2"' board of cherry stock or the equivalent An 18" square of 3/4" A-2 cherry plywood.

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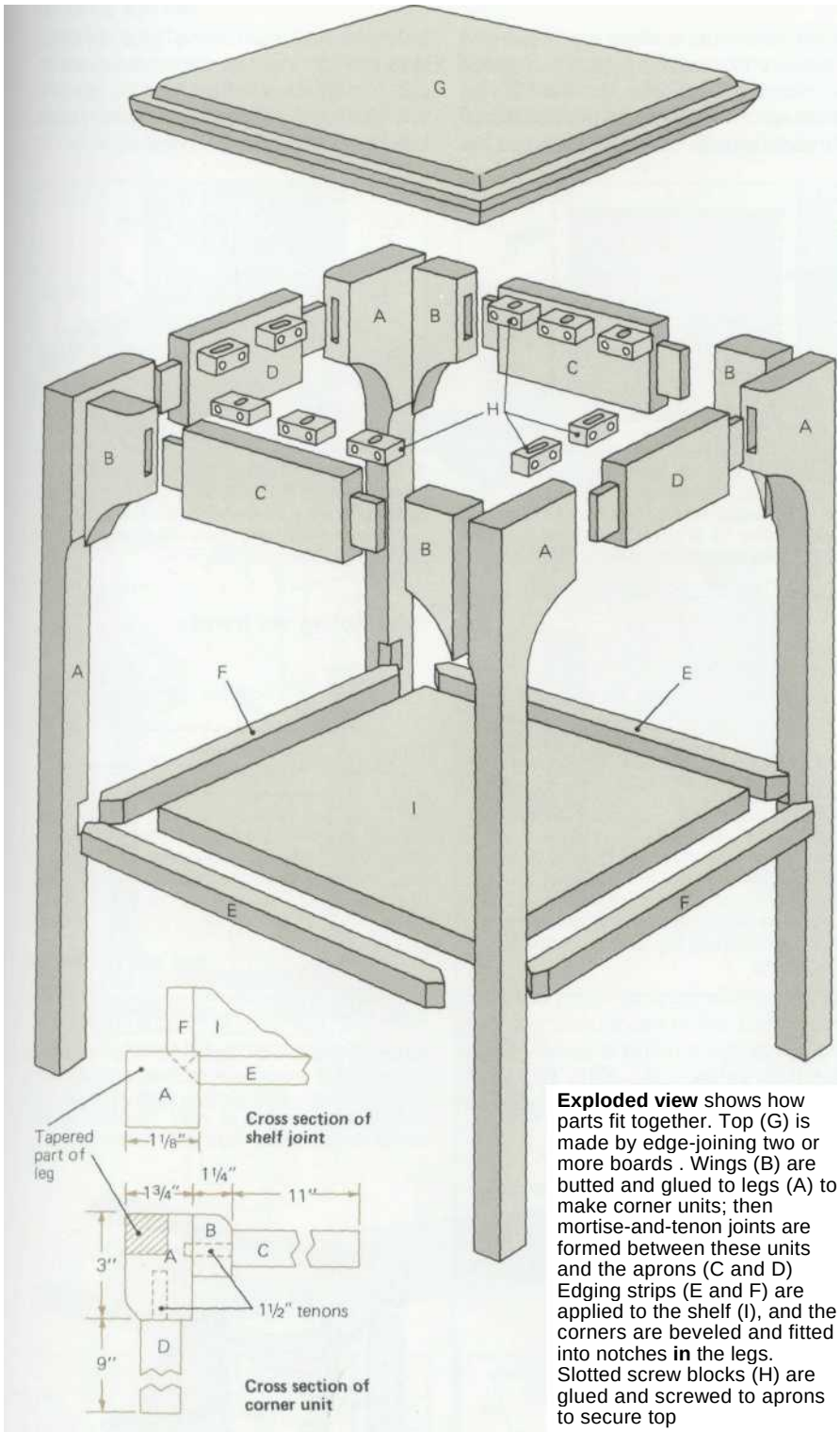
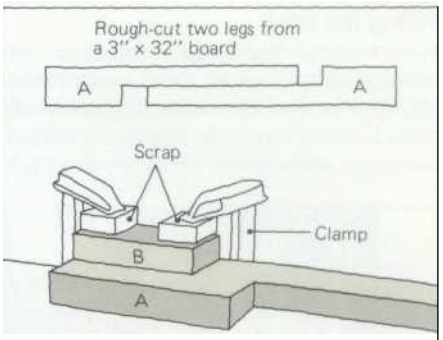
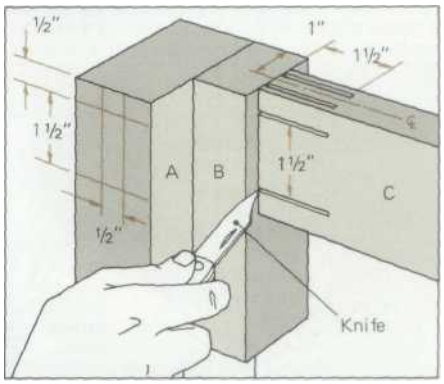


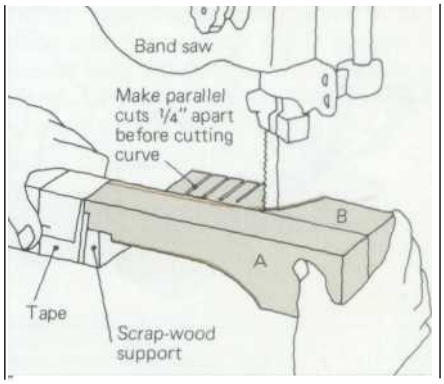
Exploded view shows how parts fit together. Top (G) is made by edge-joining two or more boards . Wings (B) are butted and glued to legs (A) to make corner units; then mortise-and-tenon joints are formed between these units and the aprons (C and D) Edging strips (E and F) are applied to the shelf (I), and the corners are beveled and fitted into notches **in** the legs. Slotted screw blocks (H) are glued and screwed to aprons to secure top



1. Plane stock to thickness for legs (A), wings (B), and aprons (C and D). Cut to length and width. Glue and clamp wings to legs to form corner units, making sure that the top edges are flush and the joints are square

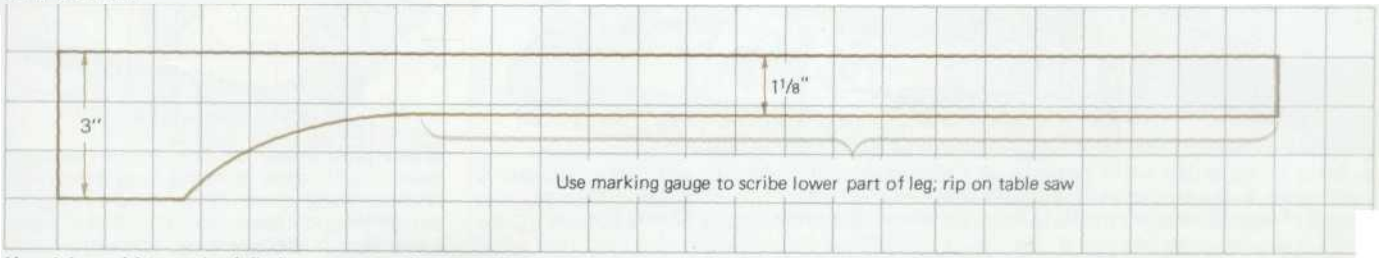


2. Use a table saw to cut cheeks of tenons 1 1/2 in. deep in ends of apron pieces (C and D). Position aprons flush with tops of corner units and mark for mortises Cut tenon shoulders and make mortises



3. Use pattern below to scribe outline of tapered leg on both outer faces of corner units Rough-cut to within 1/8 in. of scribed lines Rip straight sections on table saw, use band, saber, or coping saw to cut curves

Leg pattern



Use 1-in. grid to make full-size pattern of tapered leg on heavy paper. Scribe pattern on both outer faces of corner units.

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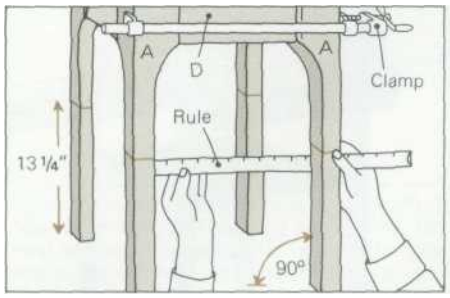
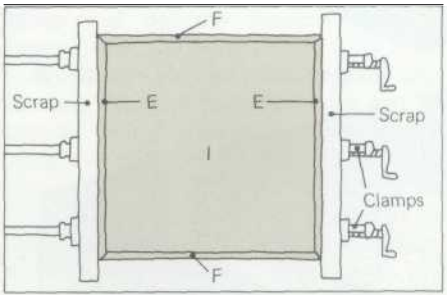
Fitting the shelf

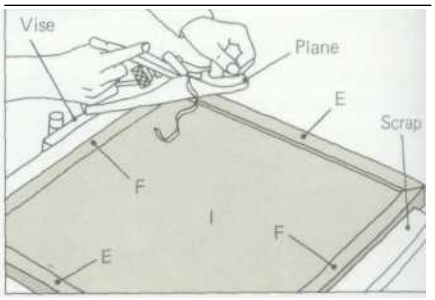
The table's sturdiness depends on custom-fitting the shelf. First, use a plane and spokeshave to reduce the rough-cut corner units to their scribed shapes. Assemble and clamp the table structure dry (no glue) with all four legs square to the ground. Cut and edge the shelf (Steps 1-3). The shelf corners are beveled so that the notches they must fit into can be cut straight across. Mark the bevel points (thickness of the edging plus 1/16 inch), then use the shelf corners themselves as patterns for the notches. After the notches are cut, doublecheck the bevel points before sawing off shelf corners.



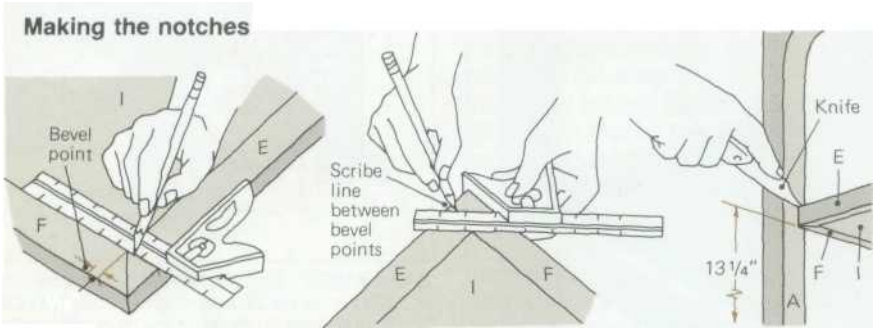
1. Rule a line around each leg 13 1/4 in. from the floor Measure the distances between the legs at these marks. Add 1/8 in. to each dimension to determine the size of the shelf (I). Cut shelf from $^{3}/4$-in plywood.



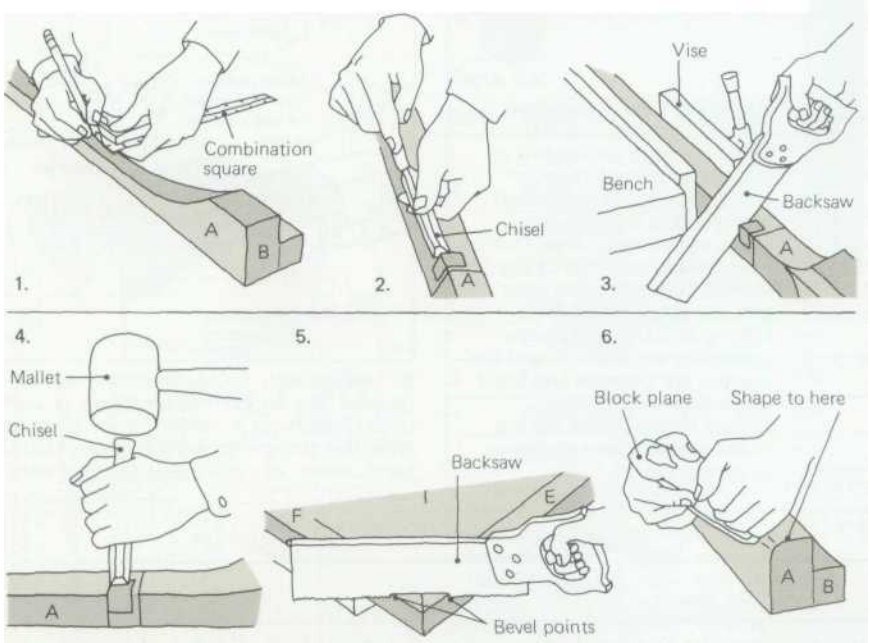
2. Miter one end of each side edging (E). Clamp to sides of shelf and cut an end edging (F) to fit between miters Mark and cut miters on opposite ends of parts E and fit other end edging. Glue and clamp edging in place.



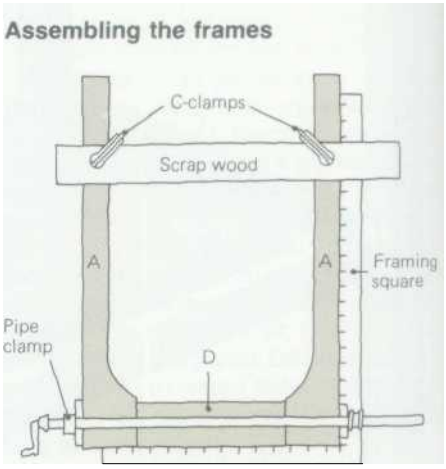
3. Plane parts E and F and sand with No sandpaper so that they are flush with both surfaces of shelf. Label each shelf corner and the corresponding leg before disassembling the table to cut the notches



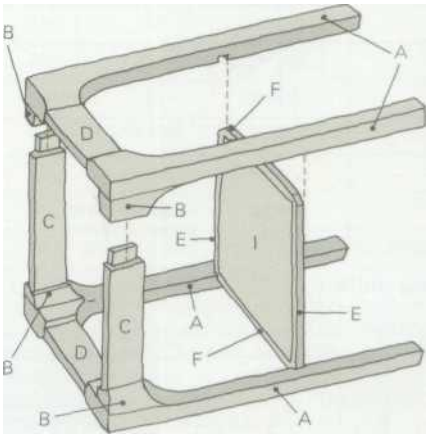
Extend outline of shelf (I) across edging (E and F); mark bevel points 1/16 in farther from corners. Hold each shelf corner against inner faces of its matching leg, and mark shelf thickness plus distance from corner to bevel points on leg



1. Scribe outline of each notch 2. Nick corner of each leg to ensure a clean saw cut 3. Cut notch to depth with backsaw 4. Chisel out notch, making its base flat or slightly concave 5. Doublecheck bevel points and saw off shelf corners. 6. Shape upper corners of legs (A) and wings (B) to the point where they meet aprons (C and D).



Sand all parts with Nos. 100, 150, and 220 paper Glue tenons of end aprons (D) into their mortises and apply pipe clamps To ensure squareness of end frames, secure scrap wood across legs with C-clamps



When glue dries, lay one end frame face down Apply glue to mortises and notches and insert side aprons (C) and shelf; then glue the other end frame in place. Stand table frame upright, square it up, and apply pipe clamps across legs

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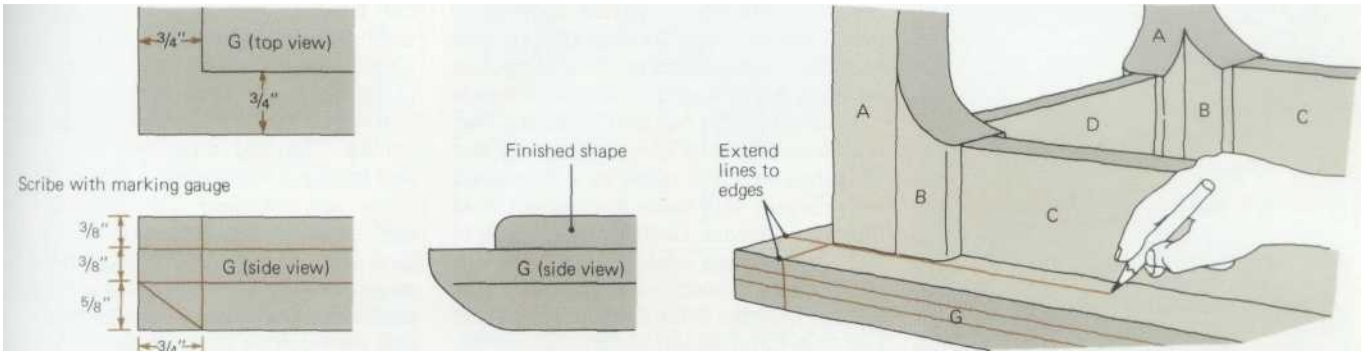
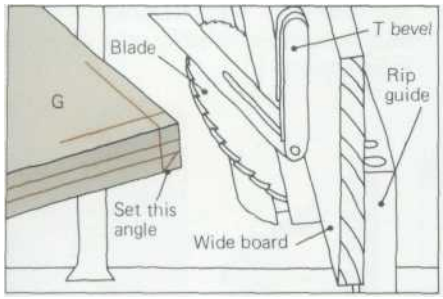
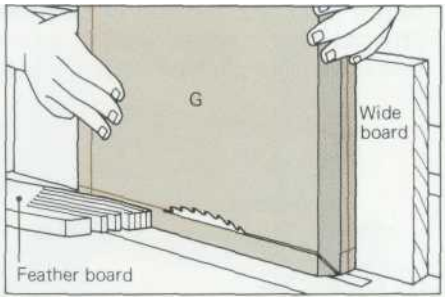
Shaping the top

The upper surface of the top is rabbeted all around to create a raised center panel. Viewed in silhouette, the edges of this panel should align with the outer surfaces of the table legs. The top's lower edge is beveled at an angle of about 40° to meet the upper edges of the corner units (A and B), Before beveling, center the table frame upside down on the underside of the top and outline the corner units; then set the angle of the table saw to cut just a hair outside these lines Gently round all sharp corners with a plane and No. 80 sandpaper to give the top a graceful form. Attach the top as shown below.

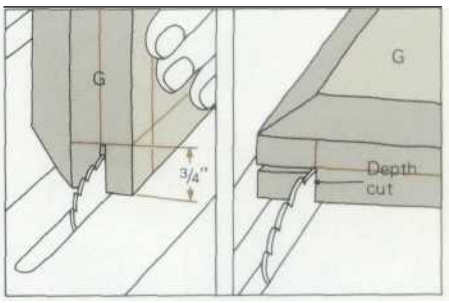




1. Use T bevel to transfer the angle from an edge of the marked-out top (G) to the table saw The blades of most saws can be tilted only to the right, so the rip guide must be moved to the left of the blade



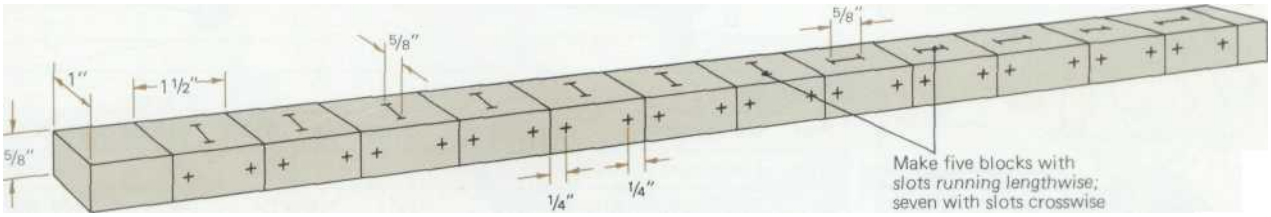
2. Make test cuts with scrap wood to find proper settings, then cut bevels along bottom edges of four sides of top.

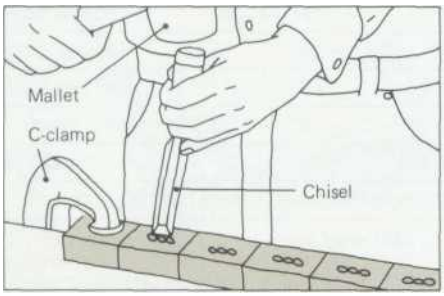


3. Move rip fence back to right side of blade and reset blade to 90°. Cut 3/4-in rabbets in all four edges of top Lower blade to 5/16 in. and adjust rip fence for depth cuts. Finish rabbets with chisel or shoulder plane.

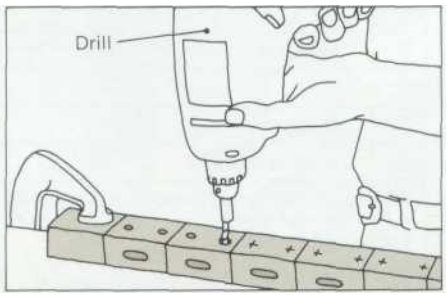
Attaching the top

Changes in humidity will cause the top to swell and shrink. If the top is firmly secured to the table structure, such movement will eventually weaken the mortise-and-tenon joints and may cause the, top to split. The problem is solved by attaching slotted screw blocks to the apron pieces, with all the slots running across the grain of the top, then driving screws through the slots and into the top. Make all the blocks from a strip of hardwood 5/8 inch thick and 1 inch wide that is at least 20 inches long, Mark out a dozen blocks as shown below—10 are needed, the other two are spares.

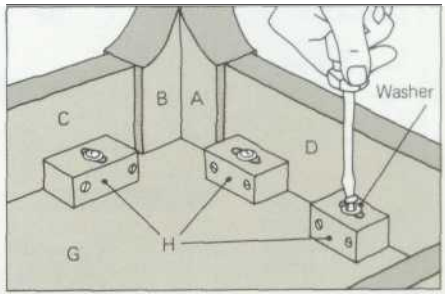




1. To make 5/8-in. slots in blocks, first drill three holes, using an 11/64-in. bit (Drill center hole first.) Then cut through waste from both sides with 1/2-in, chisel Finally, clean out the slots with 1/8-in chisel



2. Use an 11/64-in. bit to drill two shank holes through each block for the screws that will secure the blocks to the aprons Center the holes 1/4 in from the ends of the blocks Then cut the blocks apart.



3. Use glue and 1 1/2-in, No 8 screws to mount three blocks on each side apron (C) and two on each end apron (D). Attach top (G) with 11/4-in. No. 8 roundhead screws and 3/16-in washers. (Use 5/32-in. bit for pilot holes.)

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Dining Table

An exotic wood from Africa, zebrawood gives a new look to this classic extension-leaf dining table. Zebrawood is not easy to work; your tools and saw blades must be extremely sharp to handle it. But the dramatic gram of zebrawood is unsurpassed by any other. If you prefer a more subdued look, use any hardwood that is available as veneered lumber-core plywood, such as oak, teak, walnut, or cherry.

The veneered plywood top is trimmed with mitered hardwood edge strips; it measures 35/2 inches x 56 inches and rests on a bearer rail and two leaves. Each leaf is 22 1/2 inches x 35 1/2 inches, including the edge strips. The stationary bearer rail supports the top when the two leaves are pulled out. The leaves are screwed to tapered slides, and as they are withdrawn from their storage position, the taper of the slides causes the table top to rise gradually. When the leaves are fully extended, the table top drops onto the bearer rail (see diagrams on opposite page, bottom left). It is a good idea to use your hand to support the top so that it drops gently. Dowels glued into the underside of the top are seated in the bearer rail to keep the top in position To return the leaves to their storage position, lift the table top and slide the leaves back under it (see illustration opposite)

In order to prevent scratches, the underside of the top is covered with felt where it touches the leaves. To compensate for the thickness of the felt at the ends of the top, plastic laminate is glued to the underside of the bearer rail.

In the chart the dimensions for the legs are given as though they were a single piece of wood; actually, each leg is made from two pieces of hardwood, each 1 3/8 inches thick, glued face to face. Be sure the slides are perfectly straight or the leaves will not operate smoothly. Wood of a thickness of the slides (1/2 inches) is likely to change shape after being cut because of the release of fibers. Therefore, it is a good idea to cut the wood close to the required width, joint it again (see Step 7), and then cut it to the final width. When making crosscuts, follow a similar practice; cut close to the line on the first pass, then make the second pass with the

Parts list

Part	Name	Quantity	Thickness	Width	Length	Material
A	Top	1	¾"	33"	53½"	Plywood
B	Leaf	2	¾"	33"	20"	Plywood
C	Top side edge strip	2	¾"✲	1½"	56"†	Zebrawood
D	End edge strip	6	¾"✲	1½"	35½"†	Zebrawood
E	Leaf side edge strip	4	¾"✲	1½"	22½"†	Zebrawood
F	Leg	4	2¾"	2¾"	28½"	Zebrawood
G	Side apron	2	1½"	2¾"	48"	Zebrawood
H	End apron	2	1½"	2¾"	27½"	Zebrawood
I	Bearer rail	1	¾"	8½"	33"	Plywood
J	Bearer end edge strip	2	¾"✲	1½"	32½"†	Zebrawood
K	Bearer side edge strip	2	¾"✲	1½"	11"†	Zebrawood
L	Slide	4	1½"	1⅞"	49⅛"	Hardwood
M	Center support	1	1½"	2¾"	30"†	Hardwood
N	Slide stop dowel	4	⅜" dia.	—	1½"	Dowel
O	Joining dowel	16	½" dia.	—	3¾"	Dowel
P	Positioning dowel	2	½" dia.	—	2"	Dowel

✲Buy 13/16" thick stock and plane to ¾".
†Measurement is approximate; cut to fit during construction.

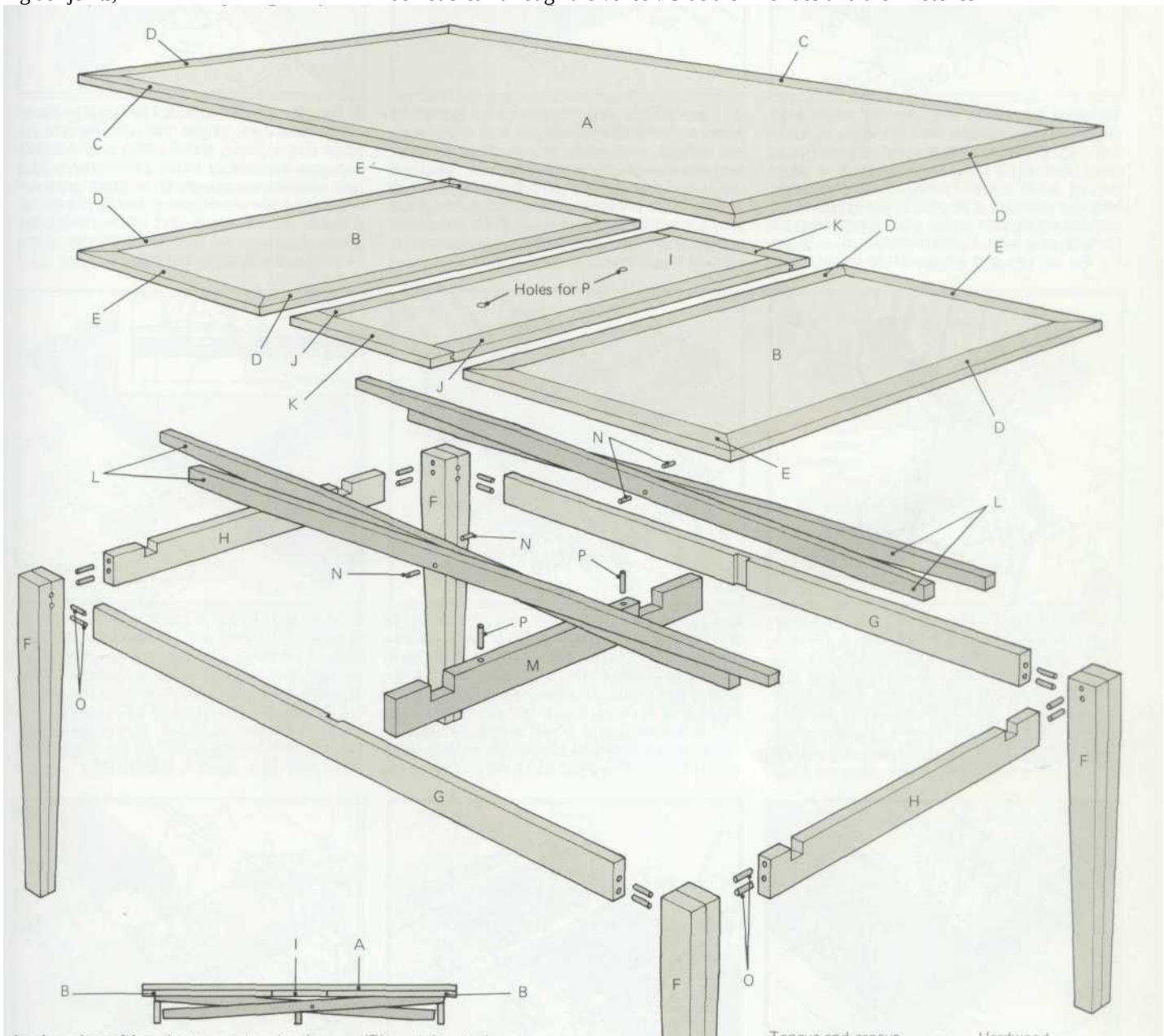
Tools and materials: Table saw with fine-tooth carbide-tipped blade, carbide-tipped rip blade, miter gauge, and crosscut tray. Circular saw with plywood blade. Router with 1/4" straight bit, 1/2" or 3/4" straight bit, 1/4" rounding-over bit, and 3/4" core-box bit. Drill with 1/2" twist bit, countersink bit, and doweling jig. Tenon saw, 1 1/2" chisel, wooden mallet, rabbet plane, smooth plane Steel tape rule, combination square, framing square, straightedge, pencil Standard screwdriver, spiral-ratchet screwdriver, awl. Vise, two quick-action clamps, two 6" C-clamps. Bar or pipe clamps as follows: seven 3'. five 4', four 6'. Two sawhorses White glue, contact cement, masking tape Nos. 80, 100, 120. and 150 sandpaper. No, 220 open-coat silicon carbide paper. 0000 steel wool. High-gloss polyurethane varnish, paste wax. paraffin, cloths. A 4' x 8' panel of 3/4" zebrawood lumber-core plywood. Solid zebrawood milled to 13/16", 1 3/8", and 1 1/2" (see chart and Step 7). Hardwood milled to 11/2" (see chart), 1/2" plywood scraps. Two 1/2" hardwood dowels 3' long, a 3/8" hardwood dowel 6" long. Plastic laminate 8 1/2" x 32 1/2". 2/3 yd felt Four furniture glides for bottoms of legs Flathead wood screws: eight 1 1/2" No 8, four 2" No 10, two 1 3/4" No 12, ten 2" No 12, and two 2'A" No 12.

blade on the outer edge of the cutting line. This technique will give the cut a straighter surface.

The project calls for a number of bar or pipe clamps in several sizes. If you use pipe clamps, you will need seven pairs of head and tail pieces; then you can buy black pipe, threaded on one end, cut to the required lengths. Whenever you glue joints, have someone on hand to help wipe off the excess glue, position the clamps, and move heavy assemblies.

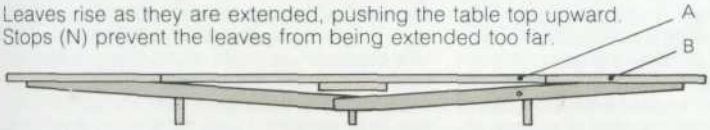
After you complete the step-by-step instructions, remove the top and leaves; then sand and finish all parts. Sand the hardwood with Nos. 80, 100, 120, and 150 paper; sand the plywood surfaces carefully with Nos. 100 and 150 paper so that you do not break through the veneer. Glue the felt to the underside of the top and put furniture glides on the legs.

This dining table was finished with four coats of high-gloss polyurethane, sanded between coats with No, 220 open-coat silicon carbide paper. A coat of paste wax was then applied with 0000 steel wool. (Alternative finishes might be tung oil or Danish oil.) Paraffin was used to wax the slides and their notches

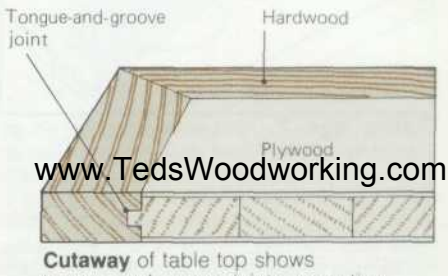


In closed position the two extension leaves (B) and the stationary bearer rail (I) are concealed beneath the table top (A).

Leaves rise as they are extended, pushing the table top upward. Stops (N) prevent the leaves from being extended too far.



Fully extended, the leaves are at the same level as the table top.



Cutaway of table top shows tongue-and-groove joint connecting

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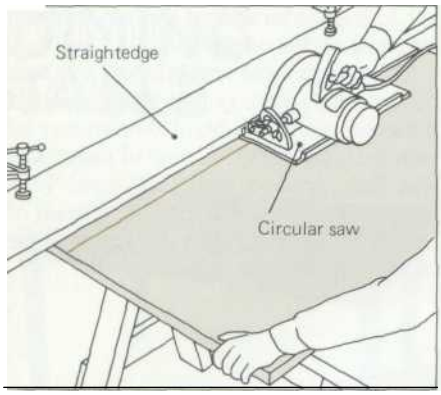
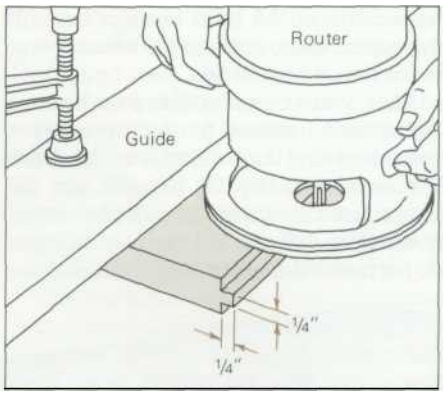
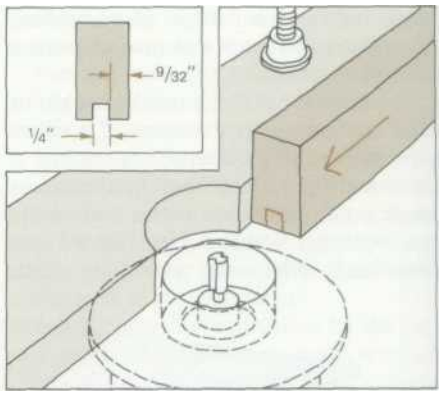


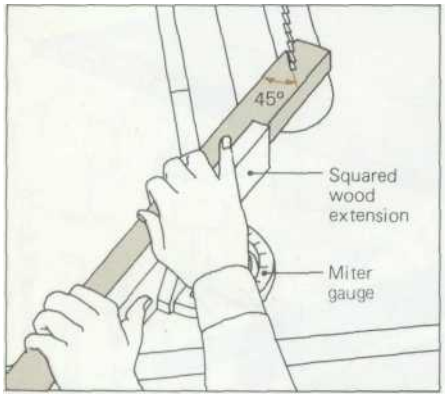
Top and leaves: 1. Rip plywood lengthwise on table saw. making first cut 33 3/8 in wide; then turn piece around and rip other edge to get a final width of 33 in, (This gives a clean cut on both edges) Place cloths on sawhorses to protect plywood, then rest plywood on sawhorses with better side down Using a circular saw with a straightedge as a guide, cut the top (A) and leaves (B) to length.



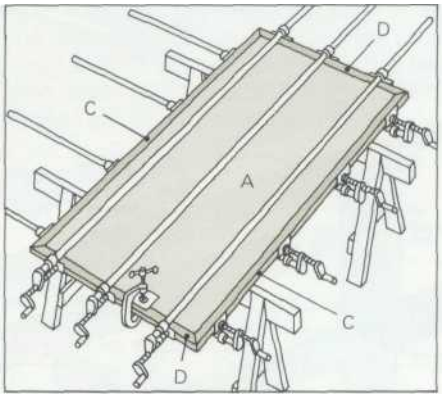
2. Practice this and the next step on scrap wood before cutting tongues and grooves in top, leaves, and edge strips. Using a router and any straight bit larger than 1/4 in., clamp a guide and adjust depth of cut to make a cut 1/4 in. x 1/4 in in plywood edges. If plywood measures less than 3/4 in, thick, reduce the depth of the cut on the underside to leave a tongue exactly *1/4* in. thick.



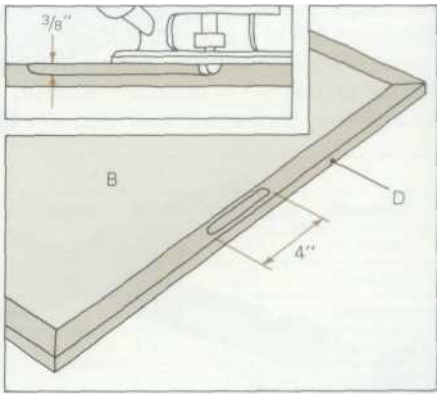
3. Rip 13/16-in. zebrawood 1 1/2 in. wide. Crosscut pieces 2 in longer than final lengths for edge strips (C, D, and E) for top and leaves. Set up a router in a table and use a 1/4-**in.** straight bit to cut a groove in one long edge of each strip Set the bit so that it leaves 9/32 in. above and below the groove (The extra 1/32 in will be planed off later.) Mark all pieces as to their orientation.



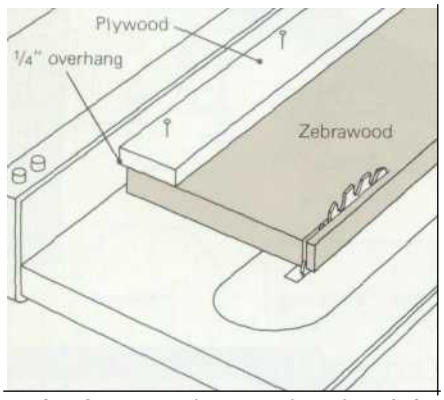
4. Extend the table saw miter gauge by screwing a squared piece of wood onto it Mark a 45° angle on one end of an end edge strip (D); saw in two passes, the first 1/16 in outside the line and the second on the line Place edge strip on top (A) and mark 45° angle at other end, saw as before Repeat for other end edge strip, side edge strips (C), and edge strips (D and E) on leaves (B)



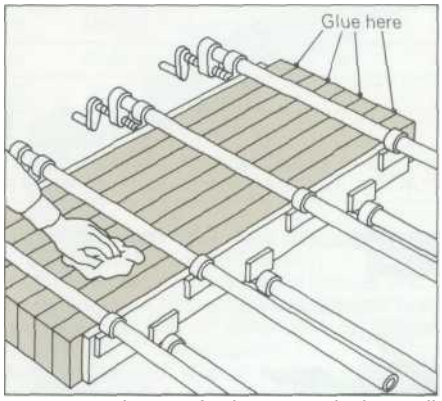
5. To glue each end edge strip to top, run a thin bead of glue on both sides of tongues and on shoulders of grooves. Clamp with three 6-ft. clamps. Then immediately glue and clamp side edge strips. (If plywood is higher than edge strip at any point, press plywood down with a C-clamp and scrap wood; be careful not to break plywood.) Wipe off excess glue with damp cloths. Repeat for each leaf.



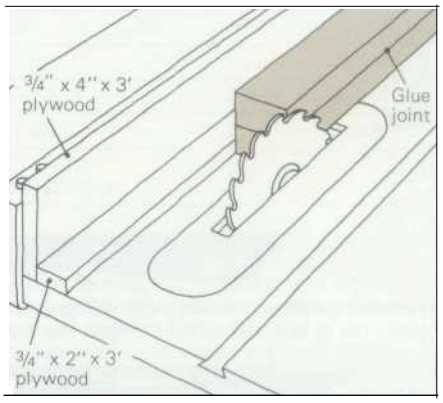
6. When glue has dried, plane upper surfaces of edge strips level with plywood, put masking tape on plywood to avoid nicking veneer Use a router and 3/4-in core-box bit set 3/8 in. deep to make a 4-in -long finger groove (for pulling out leaves) on underside of each leaf Plunge router at beginning of cut; at end turn motor off, wait until bit stops, and lift out. Sand edge strips with Nos. 80 and 150 paper



Cutting legs: 7. Joint one edge of **1 3/8-in.** zebrawood stock Make a straightedge by ripping a strip of 3/4-*in* plywood about 3 in. wide Nail it to one edge of stock so it overhangs 1/4 m Trim 1/4-1/2 **in.** from other edge Then with the edge you just cut riding the fence, rip enough boards to *2 13/16* in wide for eight lengths of 31 in Each leg (F) is made of two well-matched pieces glued together



8. Lay out three 3-ft clamps and place all eight leg pieces across clamps, inner surfaces up Spread glue on these surfaces Turn pieces on edge and press two glued surfaces together, making sure all ends and edges are flush Tighten clamps and add four more clamps across top Wipe excess glue from all surfaces Loosen, remove, and retighten the clamps one at a time to wipe beneath them



9. Screw a fence of 3/4- x 4-in. plywood to table saw fence. Screw a second piece of plywood 3/4 in. x 2 in. x 3 ft to this fence as shown. Set saw blade 2 3/4 in high, and set fence so that blade will shave 1/32 in from one surface of each leg where the glue **joint** shows. Saw all four legs; remove small piece of plywood, set saw for a 2 3/4-in. cut, and saw opposite surface of each leg flush.

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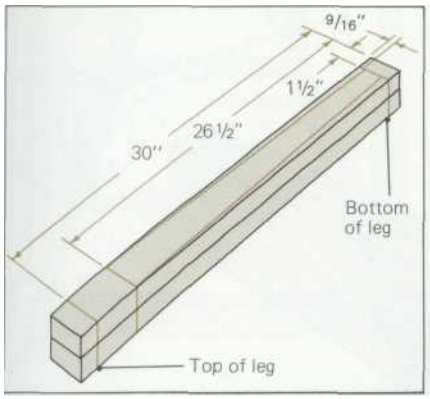
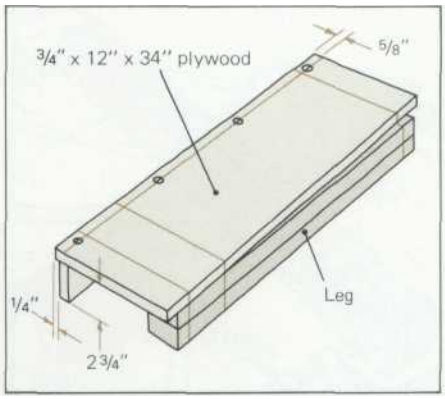
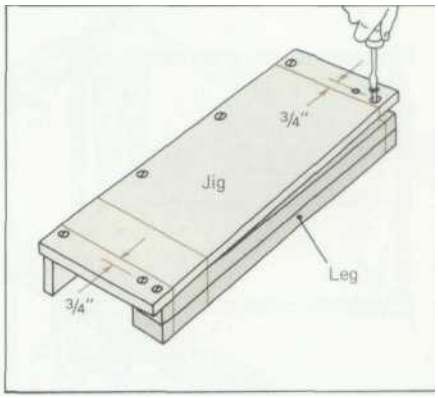


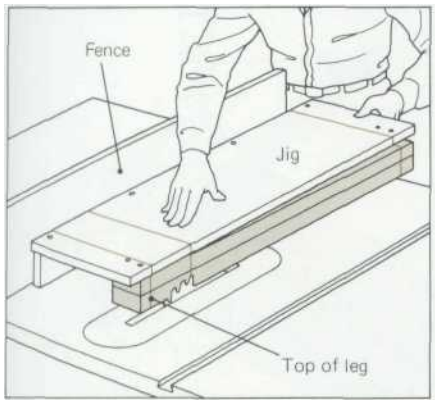
Shaping legs: 10. Use combination square to draw lines around each leg at 1 1/2 in, 26 1/2 in and 30 **in.** from bottom The span between 1 *1/2* in and 30 **in.** is the final length of the legs 28 1/2 in Mark corners of each leg tor taper by measuring in 9/16 in. from each edge along first line from bottom Use a straightedge to draw lines from these points to outer edge of each leg at **26 1/2-in.** line



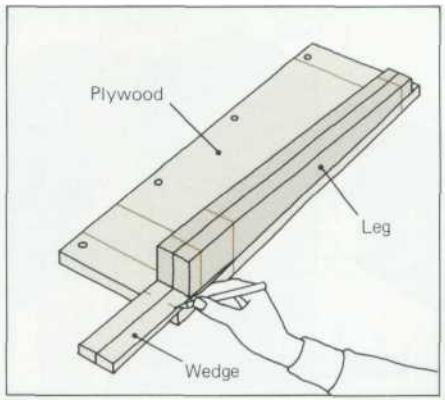
11. Make a jig for cutting tapers from a squared piece of plywood 3/4 x 12 x 34 in. Transfer the lines from one of the legs to the plywood and mark them across plywood. Draw a line 5/8 in, from one edge of plywood. Cut another piece of plywood 3/4 x 2 3/4 x 34 in. Set small piece perpendicular to large piece 1/4 in, from edge and below 5/8-in, line. Insert four 1 1/2-in. No. 8 screws along that line.



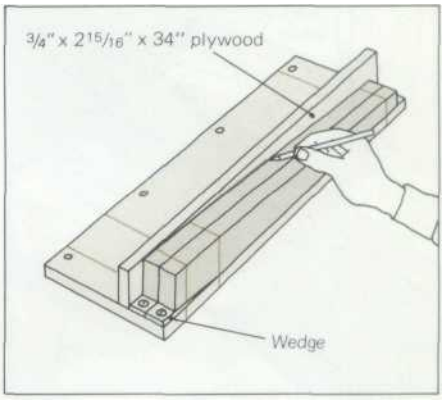
12. Drill four holes with a 3/16-in bit in the large piece of plywood 3/4 in. outside the lines indicating the top and bottom of the leg; drill two holes at each end. Align a leg's taper line, drawn in Step 10, with the edge of the jig and match the top and bottom lines of the leg with the corresponding lines on the jig. Drill into the leg through the four holes in the jig with a 3/32-***in*** bit; insert 1 1/2-in No. 8 screws



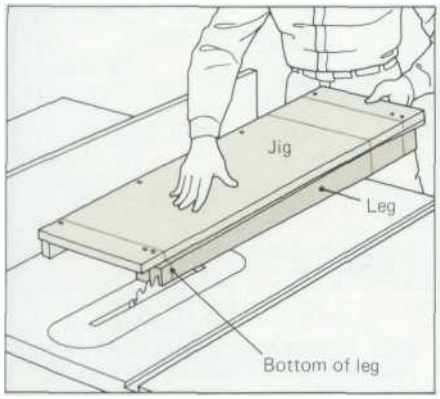
13. Set fence for a 1**2 1/32-in.** rip cut Because of the thickness of the legs, make several passes, raising the blade about 1 in. for each pass Reset fence for a 12-in. cut; shave off final 1/32 in in one pass for a clean cut. Redraw lines across cut surface with combination square Then saw opposite surface of leg by reversing it on jig; redraw lines. Save the wedges Repeat on the other three legs



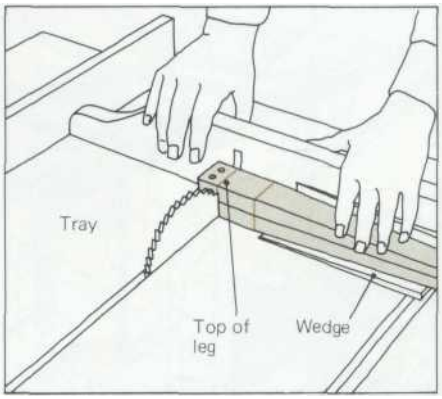
14. Before tapering other two surfaces of legs jig must be remade to fit tapers just cut Unscrew small plywood piece Lay large piece of plywood on table, place a leg on it. lining up top and bottom marks Hold down tapered portion of leg. and fit a wedge between plywood and untapered part of leg Mark wedge where it intersects end of **jig.** saw at this line, and screw wedge to jig



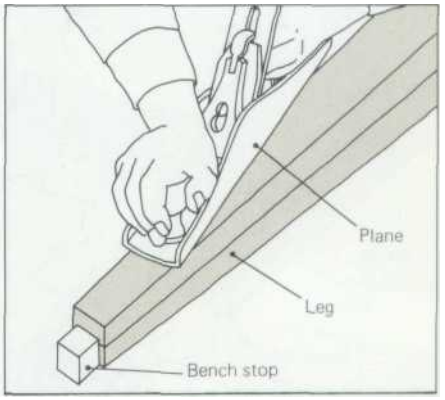
15. Mark taper on remaining surfaces Screw a leg to large plywood piece, tapered surface up. Cut a plywood piece 3/4 x 2 15/16 x 34 in Hold this against leg and mark taper on it Unscrew leg, nail large plywood piece along taper line just marked, and saw along that line with fence set at 12 in Remove nails Screw tapered piece to underside of large plywood piece, as before, with edge just cut down



16. When you cut the final two tapers, the leg must always be oriented the same way on the jig, with the bottom of the leg being fed through the saw blade first Saw the tapers in several passes raising the blade for each pass, with the fence set first at 12 1/32 in., then at 12 in , as you did in Step 13 Once again be sure to redraw all the squared lines as soon as you finish cutting each surface



17. To saw legs to final 28 1/2-in. lengths, you will need a crosscut tray wide enough to accommodate the length of the taper (If you have a radial arm saw, use that instead.) Put leftover wedges beneath and behind each leg to square it with the back and base of tray. Cut off excess at tops of legs. Reverse wedges set a stop on tray so that all four legs will be the same, and make cuts at bottoms.



18. To remove saw marks, plane tapered surfaces very lightly with a smooth plane Do not touch untapered parts Decide on placement of legs (glue joints should face ends of table), and number them 1 4, Designate each joint surface as a or b; a will be joined to a side apron, b to an end apron On a plan label aprons I -IV (see next step), and write on each joint face the part to which it will be joined.

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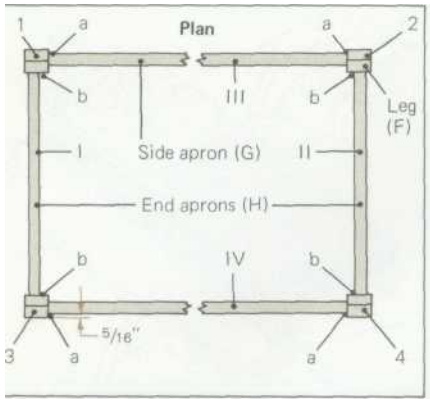
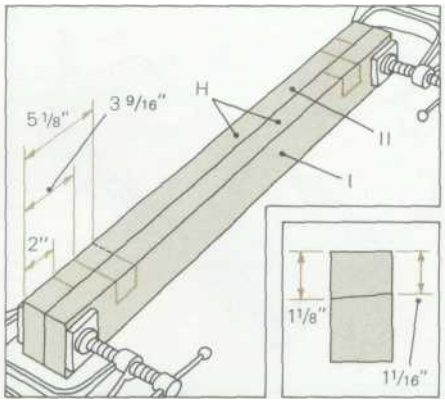
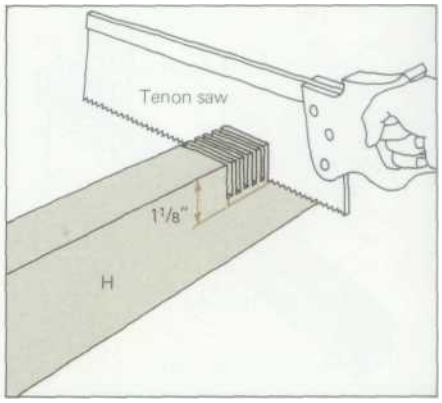


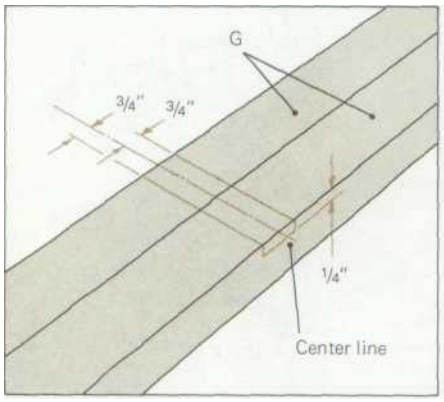
Making the aprons: 19. Joint 1 1'/2-in. stock, using method shown in Step 7. Rip and crosscut aprons (G and H) slightly larger than their final widths and lengths. Then joint each piece; rip and crosscut to final widths and lengths (Jointing twice helps ensure straightness, as wood changes shape when fibers are released by sawing.) Mark end aprons I and II, side aprons III and IV.



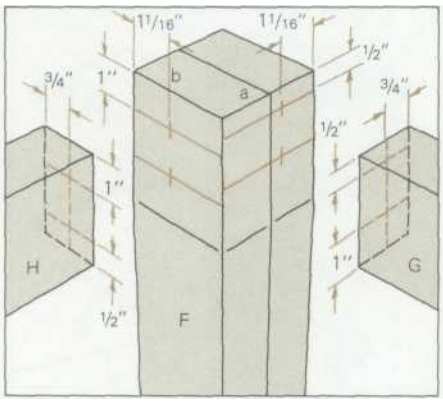
20. To mark end aprons (H) for slide grooves, clamp them inner face to inner face with ends flush. Using combination square, draw lines across top at 2 in., *3 9/16* in., and 5 1/8 in. from each end Unclamp. Draw lines across both faces of end apron I at 3 9/16 and 5 1/8 in.; draw lines across faces of end apron II at 2 in. and 3 9/16 in, Mark depth of grooves: 1 1/16 in. on the outer faces and 1 1/8 in. on the inner faces.



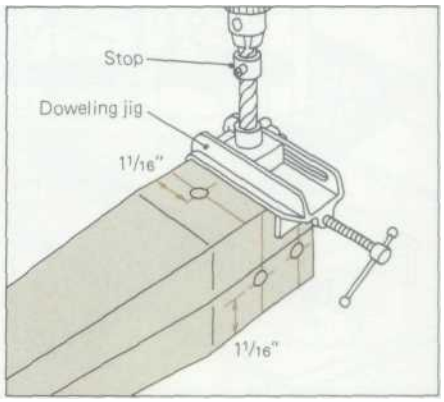
21. Set crosscut blade on the table saw to height of 1 1/16 in and make parallel cuts in the grooves, keeping the blade inside the lines drawn (or use dado head in table saw). Use a tenon saw to angle the cuts to the 1 1/8-in. depth on inner face. Use a 1 1/2-in, chisel and a wooden mallet to chop out the remaining waste. Clean the bottom of the cut with the chisel held beveled side up.



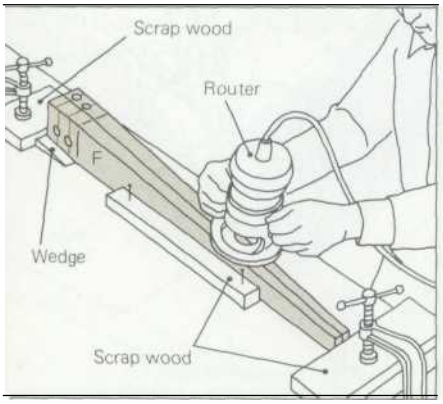
22. Clamp side aprons (G) side by side, and mark a center line across width of their inner faces (those that will face center of table). Draw lines 3/4 in. to each side of center line for grooves. Unclamp pieces; mark grooves for 1/4-in depth Cut these 1 1/2-in.-wide grooves with a dado head in the table saw, or use a router with any straight bit Plane outer surfaces of all aprons to remove saw marks.



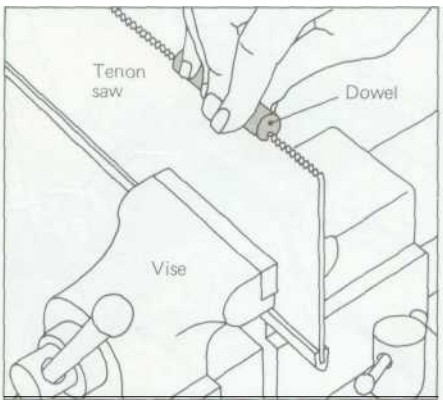
23. Lay out positions of dowel joints on apron ends For joint a on side aprons (G), measure 1/2 in. from top and 1 in. from bottom. Using a combination square, draw lines across ends of aprons. For joint b on end aprons (H), draw lines 1 in. from top and 1/2 in. from bottom. Clamp each leg in vise and hold matching apron at right angles to it. Transfer lines to leg, using sharp pencil. Draw lines across legs



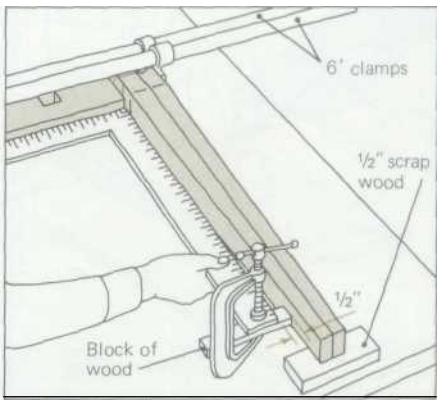
24. Set commercial doweling jig so that dowel holes will be 3/4 in. from outer faces of aprons Use a 1/2-in. twist bit, and set a drill stop at 2 in. plus the thickness of your doweling jig Align the doweling jig with marks made on apron ends. Drill holes, pushing down on drill and withdrawing it several times to get rid of waste. Set jig to drill holes in legs 1 1/16 in. from corners of legs.



25. Round corners of legs with a router and a 1/4-in piloted rounding-over bit. To hold a leg while doing this, wedge it between bench stops or scrap wood clamped to work surface Nail or clamp another piece of scrap behind leg to prevent its moving away from router. Start router at small end of leg and move it to the other end Turn leg to do other



26. Cut 16 dowels (O), each 3 3/4 in. long. Fit them in joints; if any dowels are too tight, sand them. Make a glue channel in each dowel by clamping a tenon saw in a vise, teeth up, and rubbing the dowels on the saw teeth Test-fit legs and aprons. To check squareness of legs during assembly, clamp a small block of wood so it protrudes 1/2 in. from outer edge of



27. When gluing legs to each end apron, apply glue around edges of holes, on ends of dowels, and on joint faces Rest bottoms of legs on 1/2-in.-thick scrap wood. Clamp across top and face of apron with **6-ft.** clamps Check squareness of legs to apron Measure from work surface to each leg bottom, distance should be 9/16 in. Wipe off glue; if it leaks into

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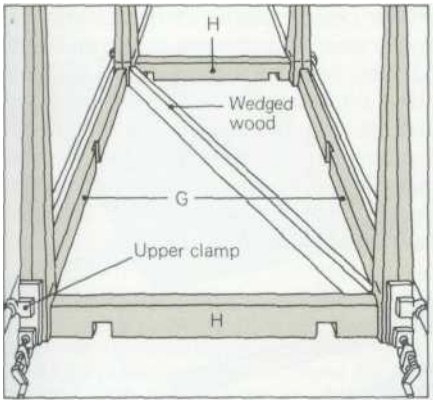
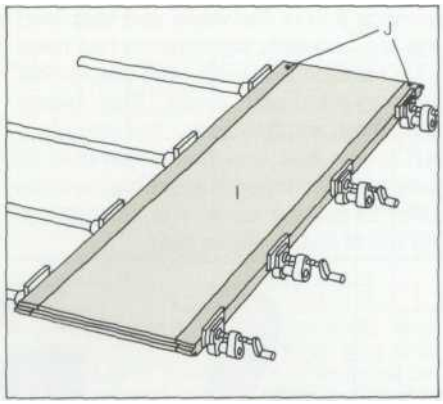
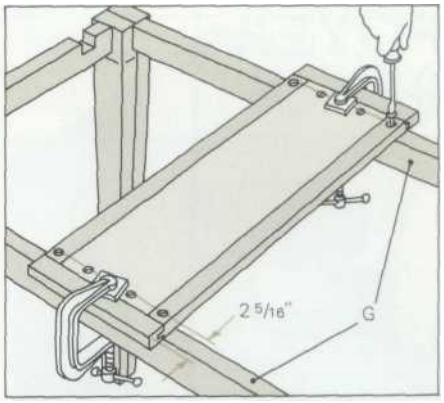


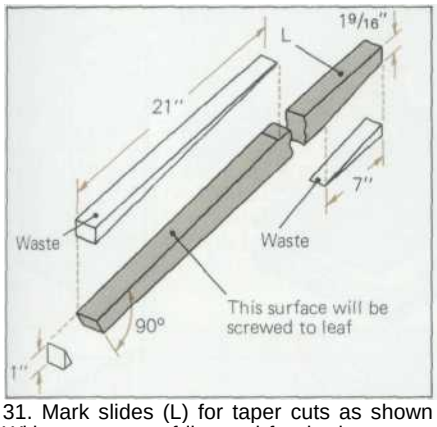
28. Glue side aprons to end assemblies, placing two 6-ft. clamps on each side. Check squareness. Adjust legs by manipulating clamps: tighten upper clamp to bring legs closer; tighten lower one to spread legs. Measure corner to corner; if measurements are unequal, cut a piece of wood the length of shorter measurement plus half the difference between the two. Wedge it diagonally.



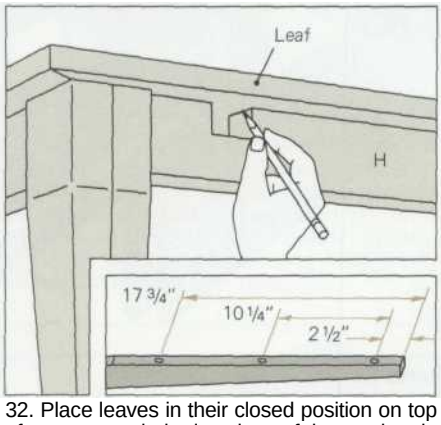
Understructure: 29. Glue plastic laminate to underside of bearer rail (I). Cut grooves in edge strips (J and K) as you did in Step 3. Cut tongues on long edges of bearer rail, and glue on end edge strips (J). Then cut tongues on short edges of bearer rail and across ends of edge strips just attached (corners are not mitered). Glue on side edge strips (K). Plane edge strips flush with plywood and laminate.



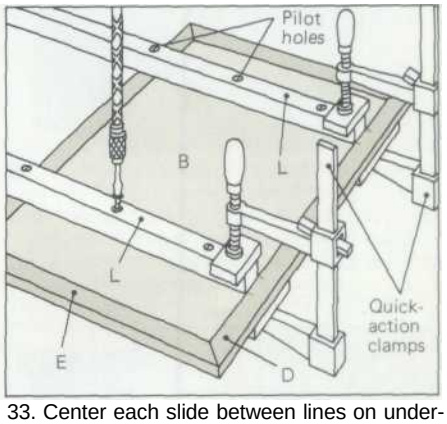
30. Center the bearer rail on side aprons, and make sure it overhangs them exactly the same distance on each side. Clamp the bearer rail in place. Draw a line 2 5/16 in. from each short edge of bearer rail. Drill and countersink pilot holes for four 2-in. No. 12 screws along the line on each side—two through the edge strips and two through the plywood. Insert the screws.



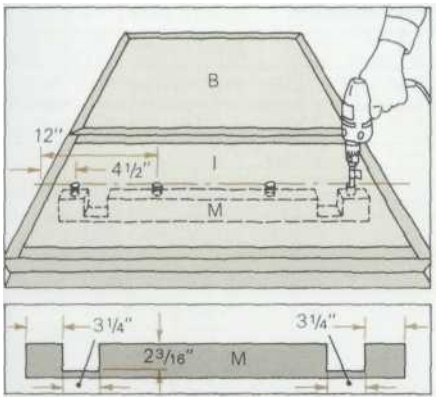
31. Mark slides (L) for taper cuts as shown With same type of jig used for the leg tapers (Steps 11 and 12). cut the long taper on one slide, use this as a template to mark other slides Saw those tapers, then repeat procedure for short tapers Long tapered surfaces will be attached to undersides of leaves and will be horizontal, mark and saw ad|acent ends at right angles to these surfaces



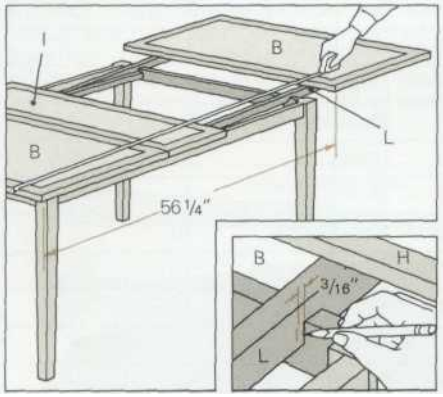
32. Place leaves in their closed position on top of aprons; mark the locations of the notches in the end aprons on undersides of leaves Remove leaves and use a framing square to extend the lines across undersides of leaves Mark undersides of slides at 2 1/2, 10 1/4 and 17 3/4 in. from ends of long tapers. Drill and countersink pilot holes for No 12 screws at these points Screws are inserted in next step



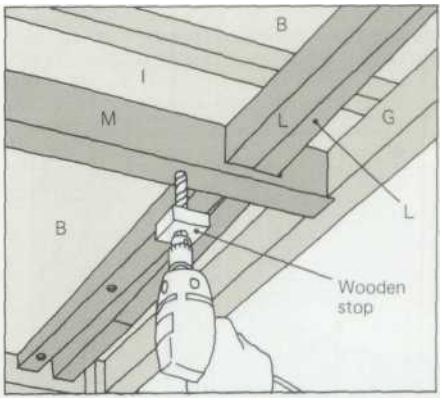
33. Center each slide between lines on undersides of leaves, aligning narrow ends with inner edges of edge strips. Clamp in place. At several points check that distance between them measures the same. Make starter holes in leaves with awl through pilot holes. Starting at narrow ends, use a spiral ratchet screwdriver to drive 1 3/4 in, 2 in., and 2 1/4 in. screws in that order, in each slide



34. Cut center support (M) to fit into dadoes in side aprons. Cut notches for slides in its top 3 1/4 in from ends, 3 /4 in. wide, and 2 3/16 in. deep Glue center support to side aprons. Using combination square, mark its position on top of bearer rail When glue is dry, drill and countersink 7/32-in. pilot holes in bearer rail and center support at 4 1/2 and 12 in from each edge of rail. Insert 2-in. No. 10 screws.



35. Position one leaf so that its inner edge is 56 1/4 in from outer edge of other leaf Mark inner faces of slides where they intersect notches in end aprons Make a second set of marks 3/16 in farther in from the first set Drill 3/8-in. holes 1 in. deep in the centers of the slides at these second marks Insert but do not glue slide-stop dowels (N) Repeat on outer faces of slides for other leaf



36. Top (A) is held in place by dowels (P). Drill holes for them 11 in from one edge of bearer rail and 13 in, from other into and through center support With leaves closed, clamp top in position, making sure all edges are flush. Put a wooden stop on drill bit at 4 in. Drill up through dowel holes into underside of top. Taper dowels to fit holes, sand them, and glue into top only

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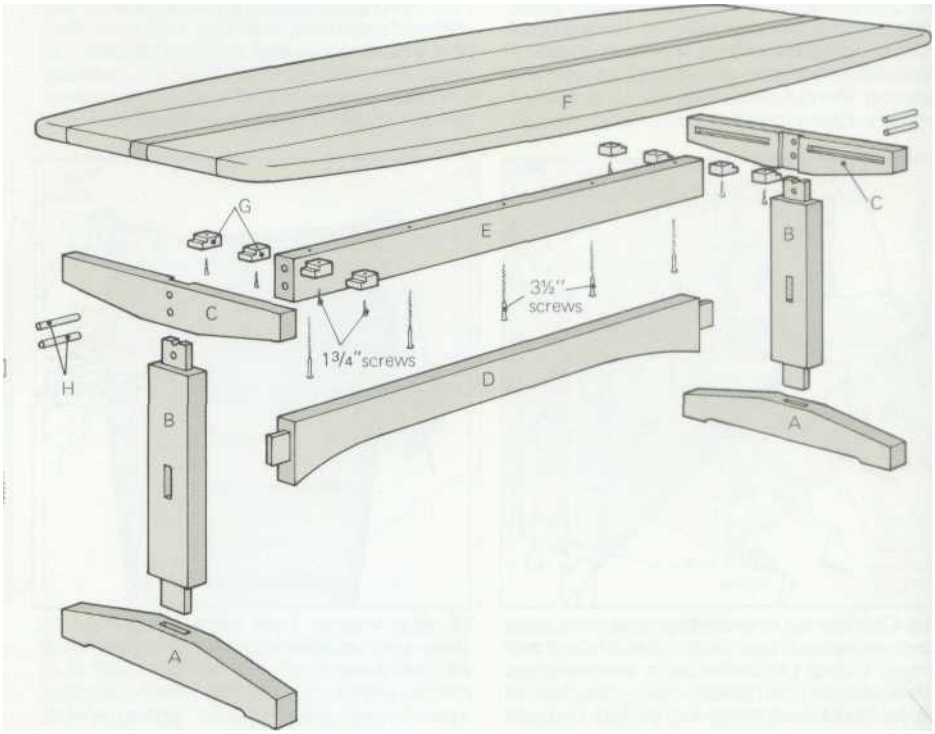
TRESTLE COFFEE TABLE

Subtle shaping brings out the beauty of the birchwood in this coffee table with a trestle base. The top is made of five edge-glued boards. The narrow center board is darker than the others and is 1 5/6 inches wide; the other four boards measure between 4 inches and *5 1/2* inches each—enough to add up to the total width of *20 1/2* inches. Buy the lumber dressed to the thicknesses given below, and rip the boards using a straightedge to ensure that they are square . Order from 25% to 30% more than the amount specified, and spend time matching the boards in different ways before you begin cutting those for the top to the final length.

Measurements given in the chart for the feet (A), crosspieces (C), lower stretcher (D), and top (F) are for the boards before they are shaped. The step-by-step directions show how to cut tapers and shape curves.Be sure to cut all the joints before shaping the parts.

The top is screwed to the base with movable buttons, allowing the wood to contract and expand with changes in humidity while being held fast.



Parts list

Part	Name	Quantity	Thickness	Width	Length	Material
A	Foot	2	1¾"	2¾"	16"	Birch
B	Leg	2	1¼"	3"	15"	Birch
C	Crosspiece	2	1¼"	2½"	14"	Birch
D	Lower stretcher	1	1¼"	3⅞"	32½"	Birch
E	Upper stretcher	1	1⅜"	2½"	29⅞"	Birch
F	Top	1	1¼"	20½"	50"	Birch
G	Button	8	1"	1¼"	⅞"	Birch
H	Dowel	4	½" dia.	—	2⁵⁄₁₆"	Dowel

Tools and materials: Table saw with combination blade, dado head, tenoning jig Crosscut tray (optional) Band, saber, or coping saw. Dovetail saw Router with 3/8" straight bit. Drill with 9/64", 13/64", 25/64" straight bits and 1/2" brad-point bit. Brace with 3/8" auger bit and depth gauge. Drill press and large hand screw (optional). Four 3' bar clamps, tour 6" C-clamps. Smooth plane, fore or jack plane. Rasp, spokeshave or Surform, cabinet scraper, 1" bevel-edged chisel, 3/8" mortise chisel. Framing square, combination square, steel tape rule, mortise gauge, knife. Wooden mallet, standard screwdriver, stubby screwdriver, hammer Carpenter's glue, wax paper. Nos. 80, 120, and 220 sandpaper. Tung oil, 0000 steel wool, hard wax, cloths. Wood (see above). Eight 1 3/4" and five 3 1/2" No. 10 flathead wood screws.

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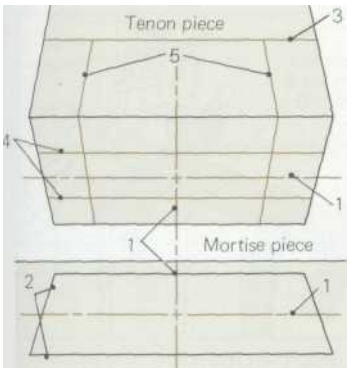
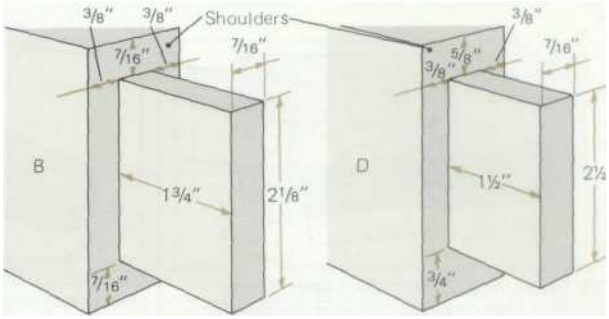
Mortise-and-tenon joints



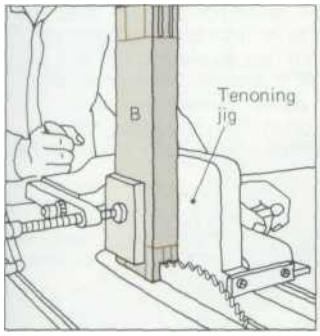
Cut and fit mortises and tenons prior to shaping parts To lay out joints on legs (B), lower stretcher (D), feet (A), and crosspieces (C), mark in numbered order as at left.

1. Mark center lines.
2. Hold each piece that will have a tenon against its mortise piece (see captions at right for placement). Match center lines, and outline tenon pieces on mortise pieces
3. Mark shoulder line of each tenon.
4. Use a mortise gauge to mark the thickness of each tenon on the end and sides of the tenon piece.
5. Mark the length of each tenon. Mark mortises in Steps 7 and 10.

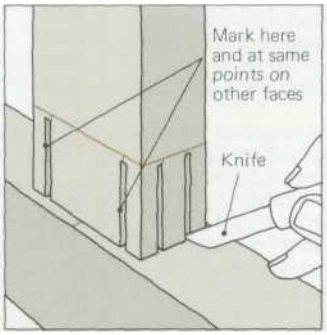


Cut this tenon on both ends of legs (B). Mortises are centered in the feet (A) and the crosspieces (C).

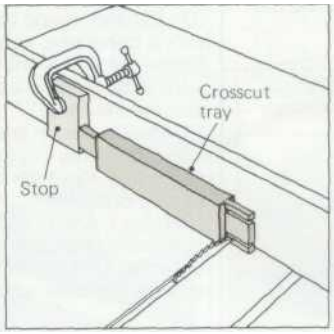
For tenons on lower stretcher (D), measure 4 in from shoulders of top tenons on legs to top of D in Step 2.



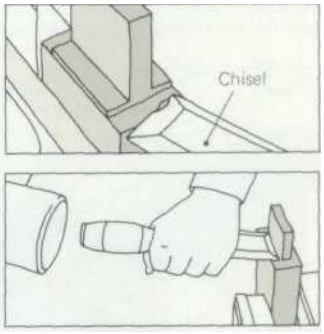
Cutting the tenons: 6. Use a tenoning]ig on the table saw, and set the blade so that it cuts a scant 1/16 in. below the shoulder lines On each tenon on both legs (B) cut one face; then reverse the work in the jig and cut the other face. Make all similar cuts before resetting the jig to make the next cut



7. Before sawing the waste at the shoulders, center each tenon piece over its mortise piece. Hold a knife against the inner surface made by each saw cut and use it to mark the dimensions of each tenon on its mortise piece These lines will later be extended (Step 10) to mark the outlines of the mortises.

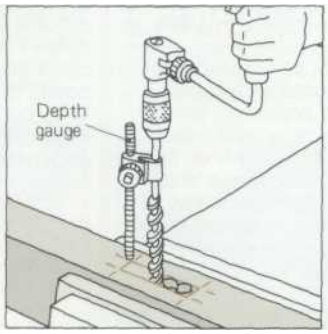


8. Clamp a scrap of wood to the crosscut tray as a stop; position it so that the saw will cut a scant 1/16 in. from the shoulder lines. Adjust the blade height, and cut off all the waste, turning each leg and holding it against the stop. If you do not have a crosscut tray, saw off the waste with a dovetail saw or other fine-tooth saw.

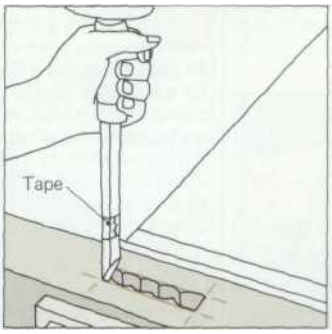


9. Trim each joint to the shoulder line with a narrow chisel, held with its beveled side up Take paring cuts (do not use the mallet), working from one side, then the other. Trim along the long edge with your widest chisel and a wooden mallet. Follow the same procedure for the through tenons on the lower stretcher (D)

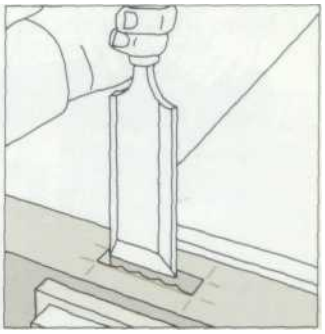
Marking and cutting mortises: 10. Set mortise gauge by marks made in Step 7; mark sides of each mortise. Using a combination square, mark the ends Mark through mortises on each leg (B) the same way, and square markings around to opposite face. Have mortise gauge bear on same edge of each piece.



11. Using a brace and 3/8-in. auger bit, set depth gauge so that the bit will bore a scant amount deeper than each tenon's length. Drill on center line, making several holes. For each through mortise, bit should just pierce opposite surface. Turn work over and drill from that point or from center line.

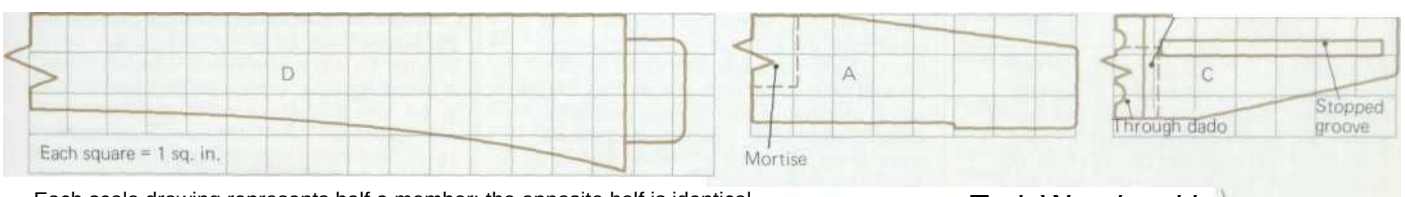


12. Mark the mortise depth on the mortise chisel by wrapping it with tape to match the length of each tenon. Use the chisel and a mallet to chop out the waste at the ends and in the bottom of the mortises. Work inward from both faces of the legs toward the center of the through mortises to clean their ends



13. Use a wide chisel (but not a mallet) to take paring cuts that will smooth the sides of each mortise Pare off 1/32 in. from both sides to allow the tenons an easy fit; keep trying the pieces so that the joints will not be loose. Work from both faces of each through mortise so that the edges will not splinter.

Scale drawings of trestle base parts



Each scale drawing represents half a member; the opposite half is identical

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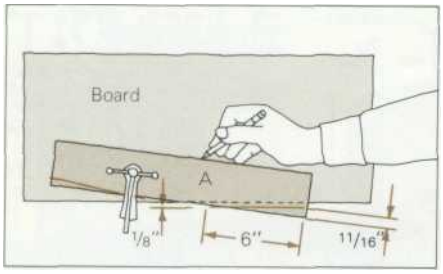
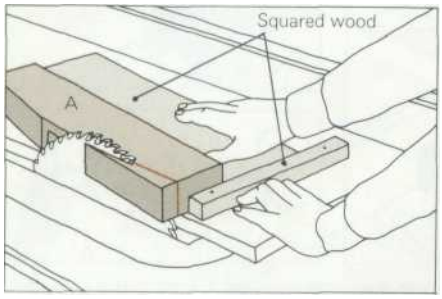
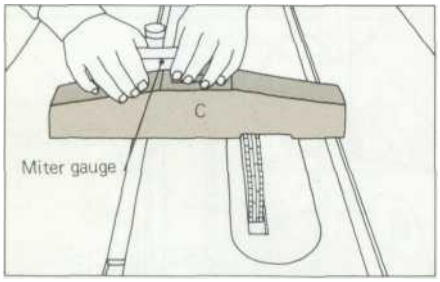


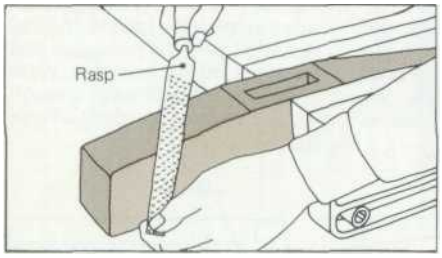
14. Measure 6 in. from each end on top edge of each foot (A), Draw a diagonal line from that point to form a triangle with an 11/16-in. base (see scale drawing, p.73). To construct a jig, clamp one foot to a squared board that is a third longer than the foot so that the taper line is parallel to the board's edge and overhangs it by 1/8 in. Outline the foot on the board, then unclamp it.



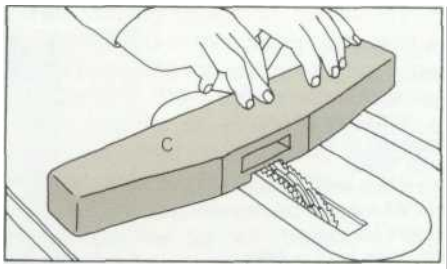
15. Nail two squared pieces of wood to the board along the side and back lines Place each foot in this jig and saw along the taper, reverse each foot to saw the taper on the other end of the foot. Use the same jig for cutting each crosspiece (C); remove a triangle 1 in. at the base and 5 in. along the lower edge of each part C.



16. Shape the underside of each foot by setting the dado head at 5/32 in high and making repeated crosscuts using the miter gauge. Or you can use a Surform tool to remove and shape the wood.



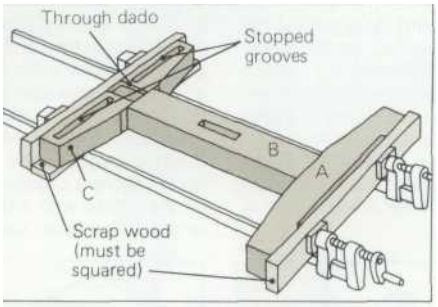
17. Round all corners and edges of feet and crosspieces with a rasp. Make one pass at 45°, and rasp off additional facets above and below until apparently round. Then finish the rounding off with Nos. 80, 120, and 220 sandpaper. Rasp and sand the underside of each foot.



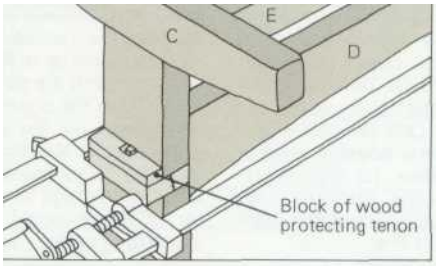
18. Use a dado head in the table saw, or a router and a straight bit, to cut a through dado in each crosspiece (C). Make it 3/16 in. deep and 13/8 in. wide. To cut the stopped grooves in the crosspieces, use a 3/8-in. straight bit in the router.

19. Enlarge the scale drawing on page 73 to make a template for the lower stretcher (D); transfer shape to wood. Cut the curve with a band saw, saber saw, or coping saw. Refine the shape with a rasp using its curved side. Rasp and sand the edges round as in Step 17.

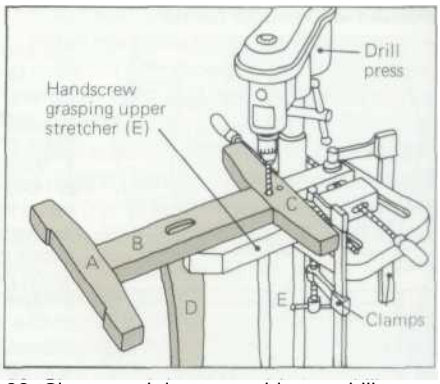
20. Mark a center line the length of the upper stretcher (E) on its bottom surface. Along that line mark the positions of the five screws that will secure the table top to the stretcher—one in the center, one 1 1/2 in. from each end, and the other two halfway between. Drill shank holes with 13/64-in. bit, and Counterbore with 25/64-*in.* bit.



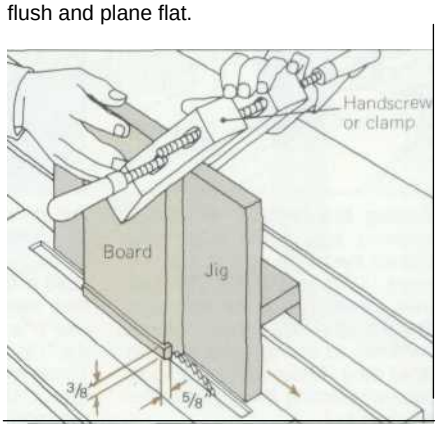
21. Glue one leg into foot and crosspiece for each end. Lay the pieces on two bar clamps with scrap wood protecting the surfaces and a scrap piece on one side of the crosspiece to make it lie evenly on the clamps. Spread glue on all surfaces of the tenons except the ends. Tighten clamps Check that each side of the assembly is the same height; tighten clamp on longer side. Repeat for other end of base.



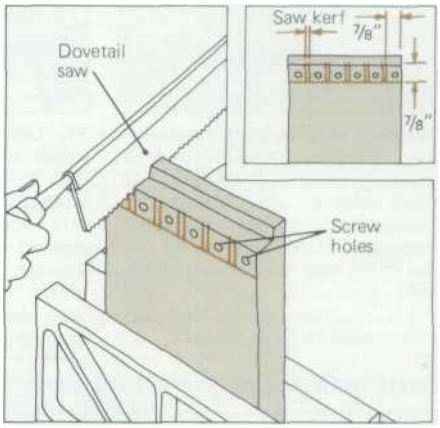
22. Cut two blocks of wood 3/4 in, x 3 in. x 3 in., and in each make a channel to accommodate the through tenons. Tape these over the through tenons to protect them. Dry-fit the base; trim joints for fit. Spread glue on tenon surfaces that will be inside mortises. Place clamps parallel to lower stretcher with handles at opposite ends. Drop the upper stretcher (E) into its dado, but glue it later. Check diagonally for squareness



23. Clamp each leg assembly to a drill press table as shown, and drill holes for dowels (H) in each crosspiece with a 1/2-in. brad-point bit. Make holes 21/4 in. deep and center them 5/8 in. from top and bottom of crosspiece. Or use an electric drill with drill guide so hole is straight. Chamfer entering end of each dowel. Spread glue onto dowels and drive them into holes with a mallet. Saw ends almost flush and plane flat.



24. To make buttons (G), square and plane a board to 1 in. thick, 5-6 in. wide, and about 1 ft long. Use the table saw to cut a cross-grained rabbet at both ends of the board 5/8 in. deep and 3/8 in. wide. Make the ^{5}/8-in. cut into the thickness of the board then stand the board on end in tenoning jig and make a ^{3}/8-in. cut (Rabbet can also be cut with a router.)



25. Scribe lines, as shown, on top of boards. To drill screw holes, clamp a scrap of wood tightly to underside and use a 13/64-in. bit. Drill through to scrap; Counterbore with ^{25}/64-in. bit. Use table saw or dovetail saw to cut along right margin of each button to the 7/8-in. line. Saw along that line to separate buttons.

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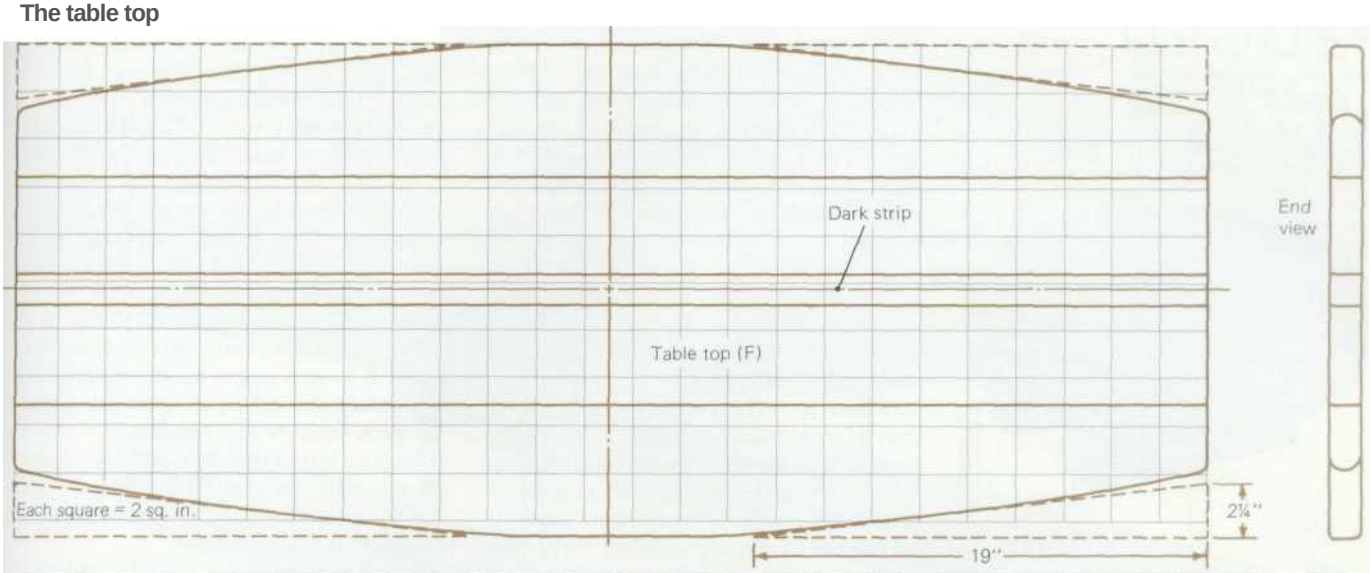
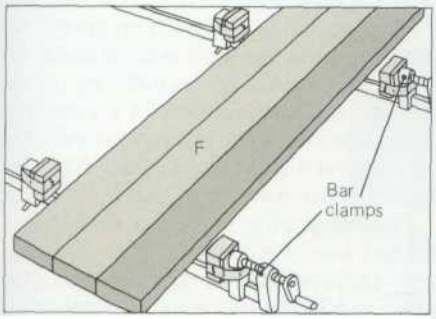
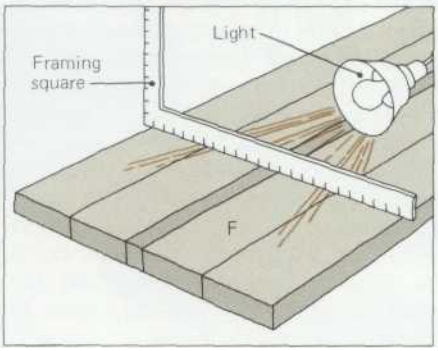
The table top

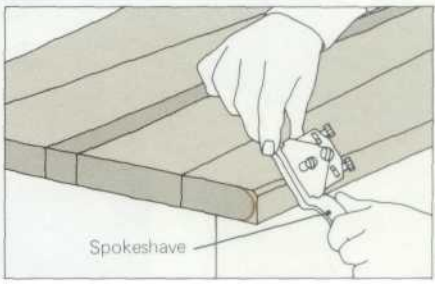




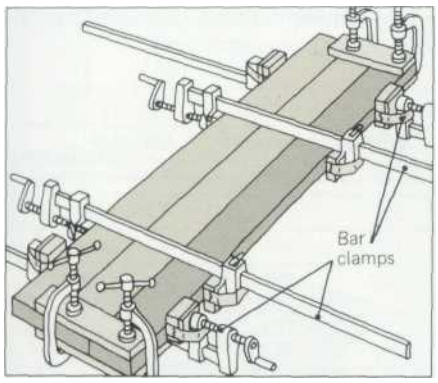
26. Check board for squareness; plane if necessary Leave board from which you will cut center strip its full width until Step 28 to make planing easier. Tape scrap wood to laws of four bar clamps; place two clamps on work surface with wax paper across bars Do a dry assembly to check procedure Apply glue to one edge of dark center board and to two boards flanking that side Join and rest boards on clamps.



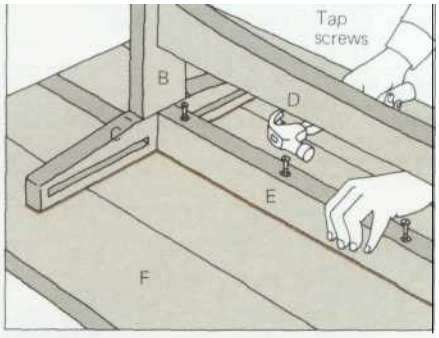
29. Scrape glue from surfaces. Beam a strong light across top, and move a framing square the length of the surface to check that it is level. Make pencil marks on high spots—where light does not show through
29. Plane down these high spots with a fore or jack plane, moving it in the same direction as the grain. Use a smooth plane to remove any remaining rough spots.



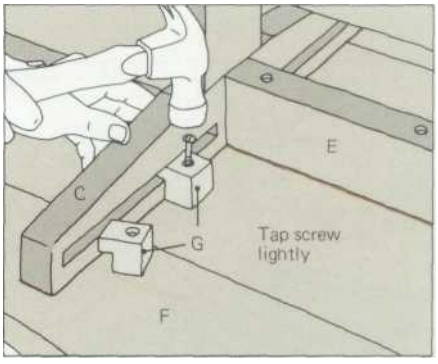
33. If remaining waste is wide enough, saw it off with a dovetail saw, otherwise use a smooth plane. Enlarge the scale drawing at top right. Transfer the curve to the ends of the table top. Use a spokeshave or a Surform tool, followed by a rasp, to shape the curve. Continue rounding along the side edges, but gradually decrease the curve toward the center so that only the corners of the vertical surface are rounded



27. Place C-clamps directly over the glued edges at each end, protecting table top (F) with scraps of wood rubbed with paraffin. Tighten C-clamps to bring edges flush. Check with hand along the length of joint that all edges are flush; pound with wooden mallet to align them. Add bar clamps across top; tighten all bar clamps
27. Remove clamps after 2-4 he, and saw center board to final width. Check for squareness and plane the sawed edge. Glue together the other two boards, as in Steps 26 and 27, then glue them to the first three boards.



31. Center base on underside of table and draw its outline. Insert a 3 1/2-in. screw in each hole in the upper stretcher, then tap screws to mark their positions on underside of table. Drill pilot holes 1 in. deep using a 9/64-in. bit. (Wrap the bit with tape to serve as a depth gauge.)
32. Make a template for shaping the table top from scale drawing at top of page. Construct a jig similar to the one used to taper the feet and crosspieces (Steps 14 and 15). Saw off triangles that are 2 1/4 in. at the base and 19 in. along the table-top edge. Tape the cutoff pieces back in place while sawing triangles from the other end.



34. Place table top face down Set base onto outline made in Step 31. Place buttons in grooves in each crosspiece. Insert a 1 3/4-in. screw in each hole; tap it to mark its position. Remove base and buttons Drill pilot holes 3/4 in. deep with a 9/64-in. bit.
35. Insert 3 1/2-in. screws in upper stretcher and tighten with a stubby screwdriver Screw buttons in place. Sand table with Nos. 80, 120, and 220 sandpaper Wet top with a cloth and let dry overnight. Resand with used No. 220 paper. Apply three or more coats of tung oil; rub each section hard until warm, then wipe dry immediately. Let sit overnight, and remove residue with 0000 steel wool Wax if desired

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Jointed Hardood Bookcase

The softly flowing lines and sturdy jointed construction this hardwood bookcase can be achieved only by care workmanship, fitting and shaping each part to blend the whole. It is a job for an experienced craftsman.

The care begins with the selection of wood. The sides are of richly textured cherry, noted for its graceful figuring, and the horizontal members are of light-colored ash, straight grained and durable. These hardwoods are seldom found at reasonable prices in the widths needed for the project; therefore, it is necessary to edge-join narrower boards (see opposite page). Choose the boards carefully so that the colors and figures will blend; to bring up the figure of unplaned wood so that you can see it, brush a little paint thinner on the surface. In any case, the faces of the boards must be planed flat before edge-joining and planed again afterward for a good, flush surface. Buy rough lumber at least *1/4* inch thicker than specified in the chart below; buy dressed lumber at least 1/8 inch thicker.

The joinery looks deceptively simple The shelves are glued into dadoes in the sides with no attempt to conceal the joints. This means that the dadoes must be precisely cut to the thickness of the shelves—there is no tolerance for error. In this project instructions are given for fitting these and the several tongue-and-groove joints when using a dado head on a radial arm or table saw.

All edges and corners are rounded and shaped by hand. This is a matter of esthetic judgment, based in part on the figure and quality of the wood you are using. A spokeshave and drawknife are the tools of choice, but you can use a rasp, plane, Surform tool, and sandpaper to good effect. Note that the edge of the plinth front (H) is 3/16 inch below the upper face of the bottom piece (E) and that both corners are rounded where they meet. This is a traditional way of turning a possible defect into a design advantage. The shelf unit is not joined to the plinth; if the two surfaces were flush, the crack between them'would always show. In this way, the crack is concealed at the bottom of a graceful ripple.

Because the weight of a full bookcase will tend to force the joints of the plinth apart, the mitered joints are reinforced with splines, and laminated corner blocks are glued all around.

Finishing: To bring out the warmth of the wood, rub in several coats of tung oil, allowing plenty of drying time.

Parts list

Part	Name	Quantity	Thickness	Width	Length	Material
A	Side	2	¾"	12"✲	44½"	Cherry
B	Top shelf	1	¾"	7¾"	24⅞"	Ash
C	Middle shelf	1	¾"	9⅛"	24⅞"	Ash
D	Bottom shelf	1	¾"	11⅜"	24⅞"	Ash
E	Bottom	1	1 3/16"	11¾"	25⅛"	Ash
F	Top	1	1¼"	10"	27¼"	Ash
G	Back	1	¼"	25⅛"✲	44⅜"✲	A–2 cherry plywood
H	Plinth front	1	1¼"	4"	29"	Ash
I	Plinth side	2	1¼"	4"	14"✲	Ash
J	Plinth back	1	1¼"	3"	26⅝"	Ash
K	Plinth spacer	1	1¼"	3"✲	10⅝"✲	Ash
L	Spline	6	5/16"	1½"	2"	Ash
M	Corner block laminate	28	¾"	1¼"	1¼"	Ash

✲Measurement is approximate; cut to fit during construction.

Tools and materials: Drill with twist bits and countersink. Table saw or radial arm saw with combination blade, dado head, and splining jig Band, saber, or coping saw. Several 6" C-clamps and 6' bar or pipe clamps, quick-action clamps (optional). Smooth plane, jack plane, block plane. Rasp, spokeshave, drawknife. and/or Surform tool. Wooden mallet, 1/4" and 3/8" straight chisels. Try square, combination square, framing square, steel ruler, steel tape rule, wooden extension rule, knife, pencil. Nos. 60, 80, 120, and 220 sandpaper. Paraffin or beeswax, carpenter's glue. Wood (see above). One 2 1/4" No 10 flathead wood screw, 3/4" No 6 panhead wood screws.

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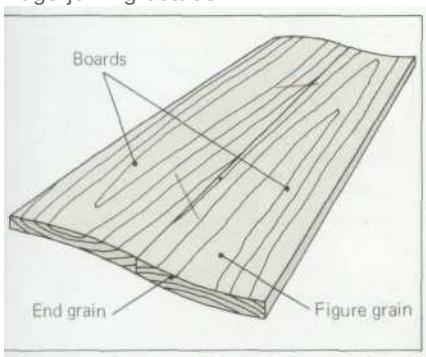
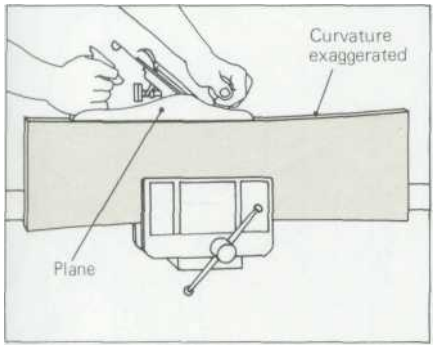
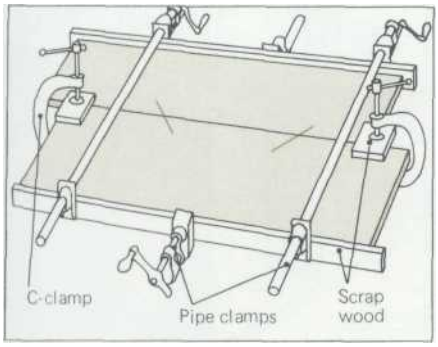
Edge-joining boards



Choosing boards. First, look at the end grain As a board ages, it will tend to cup in the opposite direction from the arch of the annual rings To minimize the effect of this warpage. lay boards side by side so that the direction of the arch alternates. Align boards so that their figures blend into an attractive pattern Use a pencil to make a few slanting lines across each joint to guide in realignment Saw boards to approximate length.

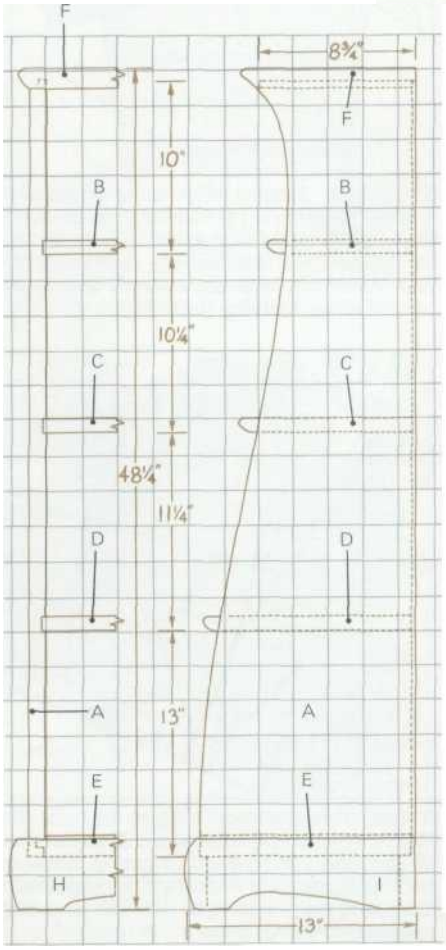


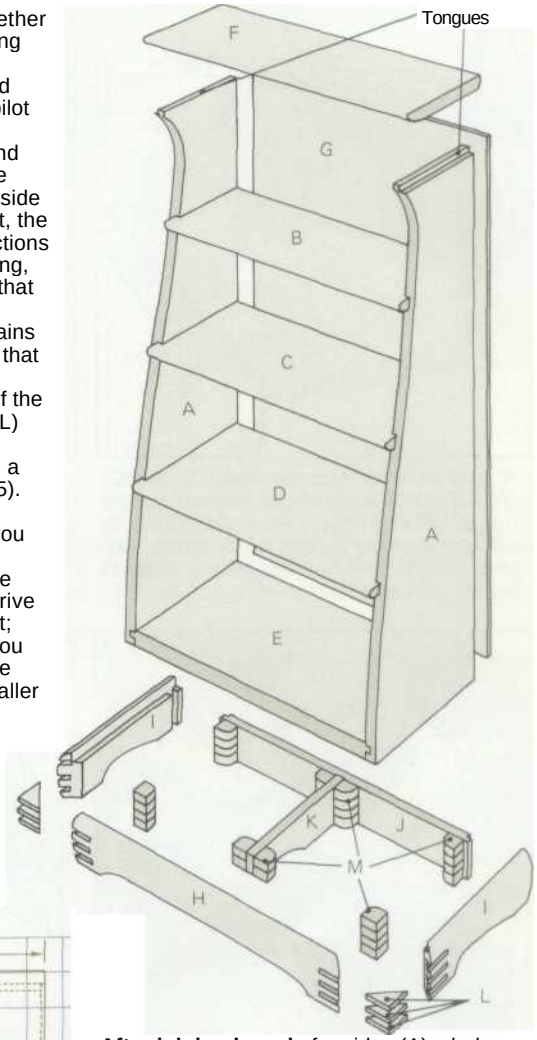
Preparing boards. Plane to within 1/8 in. of final thickness. Plane edges smooth and square The boards will eventually shrink a little more across the ends than across the middle; to prevent the wood from splitting at the ends when this happens, plane both edges of joint slightly concave the center of the **joint** should be separated by a gap that you can squeeze shut with your hands (less than 1/64 **in.)**



Gluing and clamping. Apply all clamps before gluing, mark positons and order of application. Then unclamp and apply a thin even coat of glue to both edges of joint. Reclamp quickly, tightening firmly but not forcing out all glue First, use C-clamps to align faces of boards at both ends Then apply bar or pipe clamp across center, forcing faces of boards into alignment, if necessary, as you tighten. Remaining clamps should alternate top and bottom

Exploded view shows how parts fit together All joints are glued except those securing the back (G) to the shelf unit which are secured with 3/4-in. No. 6 panhead wood screws (Step 18); use a 5/64-in. bit for pilot holes. The shelf unit is not joined to the plinth but rests on the plinth back (J) and spacer (K) and inside the rabbets of the plinth front (H) and sides (I)—if a plinth side were glued to a side (A) of the shelf unit, the fact that the grains run in opposite directions would cause stress, and probably splitting, in the shelf side. The corner blocks (M) that reinforce the joints of the plinth are intentionally laminated with the wood grains running in alternate directions, ensuring that no joint Is compromised by the sole presence of end grain. The front joints of the plinth are further reinforced by splines (L) Vie in. thick; order ash stock planed to thickness, or cut a strip to thickness on a table saw, then dado slots to fit (Step 15). There is little danger of the shelf unit slipping backward on the plinth, but if you wish to ensure its security, drill and countersink a 3/16-in. hole up through the front part of the plinth spacer (K) and drive a 2 1/4-in. No 10 wood screw through it; drill a 1/64-in. pilot hole in the bottom. You can also glue two slotted blocks onto the plinth back (J) to receive additional, smaller screws





After joining boards for sides (A), shelves (B, C. and D), bottom (E), and top (F), cut all stock to final length, and plane to final thickness Rip shelves, top, and bottom to width. Use 2-in. grid (see p.48) to make full-size patterns for sides (A), plinth front (H), and plinth sides (I) and to guide in shaping the protruding edges of the top and shelves (Step 4) To make the pattern for the plinth front, duplicate the section shown and its mirror image, connect the lines for the cutout portion with an arc that rises to the same height as the cutouts in the sides

Trace patterns onto side pieces (A). Before cutting the long S curve, use a table saw or radial arm saw to make a square cut from the top edge of each piece, 83/4 in from the back, for the front of the tongues Then rough-cut the pieces individually with a band saw, saber saw, or coping saw Clamp them back to back, and shape them simultaneously to the line with a rasp drawknife, or spokeshave Cut rabbets into the top outer edges of the sides, leaving tongues 1/2 in. thick and 1/2 in. deep Cut the dadoes for the shelves 1/4 in. deep, marking the width of each dado from the thickness of the shelf that will fit into it. (Measurements between shelf dadoes are given from bottom edge to bottom edge; to achieve dado cuts that match the thickness of the wood, make test cuts in scrap wood inserting paper washers between dado heads as necessary.) To ensure that the shelves will be level, lay the side pieces side by side and mark across both at once

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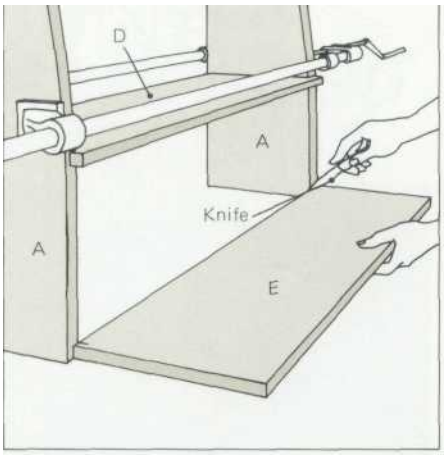
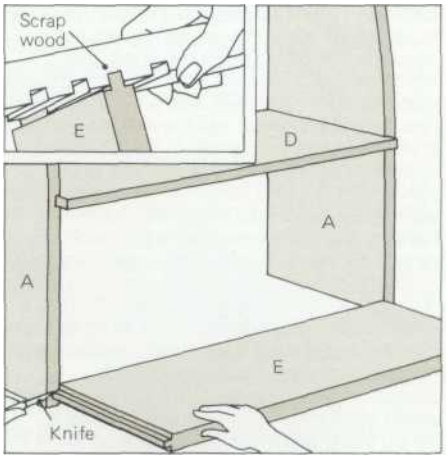
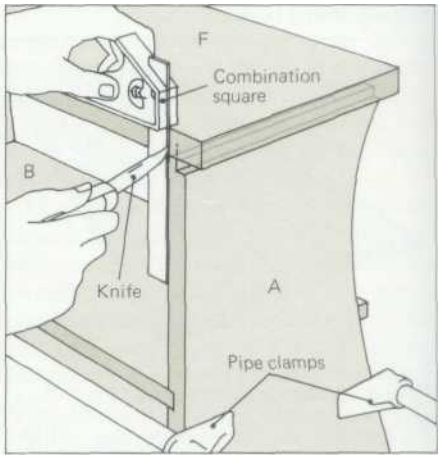


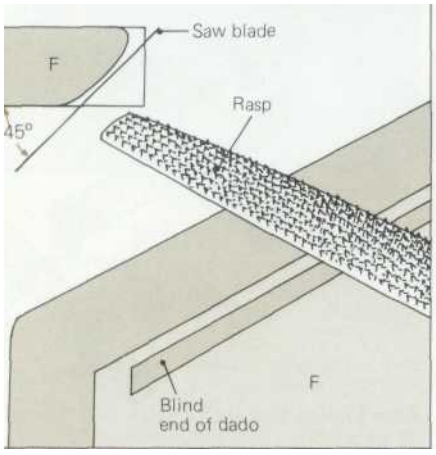
1. Clamp sides (A) and shelves (B, C. and D) together with all joints square. Center bottom (E) against front edge: use a sharp knife to mark points where bottom meets sides. Rabbet both ends of E to these marks, leaving tongues centered and 1/2 in thick.



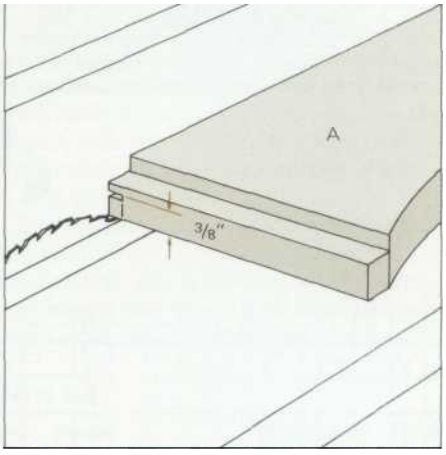
2. With a sharp knife mark position and thickness of tongues on front and back of sides (A). Make test cuts in scrap wood to set dado heads to exact width and depth needed; then cut dadoes in sides to receive tongues of bottom Reassemble unit with bottom in place



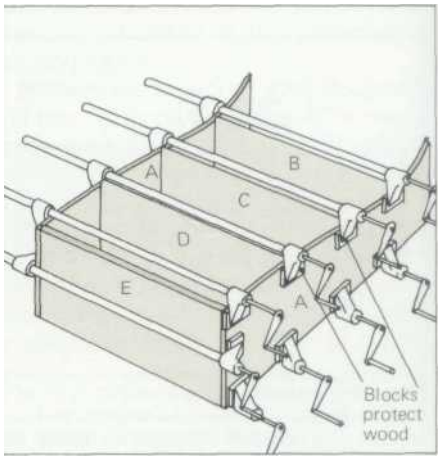
3. Position top (F) so its back is flush and overhang is equal on sides Mark width of tongues on back of top and mark front of tongues on underside Cut dadoes to receive tongues (see Step 2) Dadoes do not go all the way through; finish blind ends with a chisel.



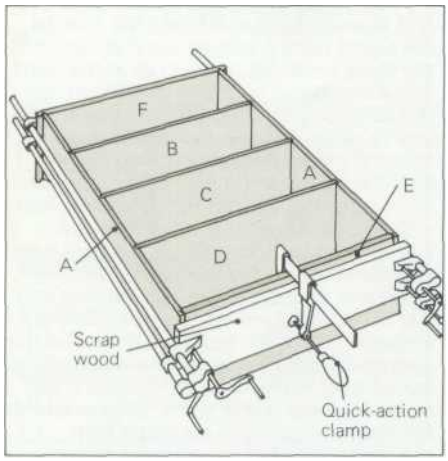
4. With top in place, sketch rounded patterns on edges of top (F) and shelves (B. C, and D) Disassemble unit and shape edges; use table saw set at 45° to remove the main body of wood from lower edge. Finish shaping with jack plane, rasp, and No 60 sandpaper



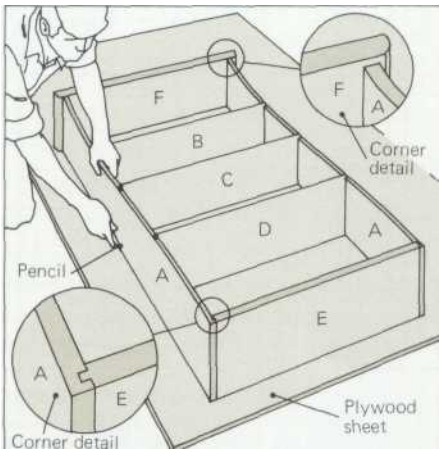
5. Cut 1/4-in rabbets 3/8 in deep in back of sides (A) and top (F) to receive 1/4/-in. plywood back. Sand all interior surfaces with No 80 sandpaper, then with No 120, and finally No 220 Assemble shelves, bottom, and sides without glue, applying all clamps



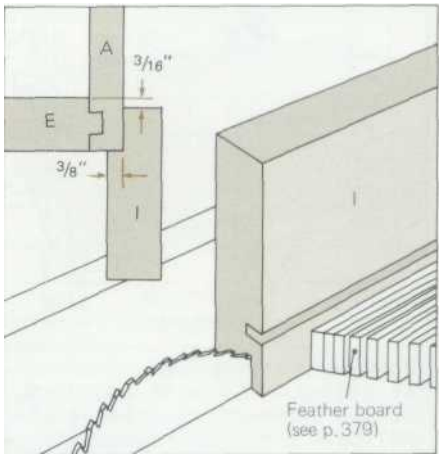
6. Use a bar or pipe clamp across the front and back of each shelf and the bottom, and apply another across center of bottom to prevent buckling Mark placement of clamps and disassemble Appty glue to dadoes and reclamp quickly Let glue dry



7. Before gluing top (F) to its tongues, cut a piece of scrap the same length as top to overhang the bottom and equalize the pressure of clamping Apply glue to dadoes and clamp top in place, using two bar or pipe clamps on each end, running to scrap on bottom



8. To find most attractive figure for back (G) lay shelf unit on plywood sheet. Trace outline of unit, and cut plywood to outline. Then fit back precisely within rabbets on sides and top Sand back with Nos 80, 120, and 220 sandpaper; do not secure it to unit



9. Rip stock for plinth front (H) and sides (I), and plane to width Cut each piece 3-4 in. longer than specified. Cut rabbets 3/8 in. deep along one face of each piece to receive shelf unit; to find width of rabbets, deduct 3/16 in. from thickness of bottom (E).

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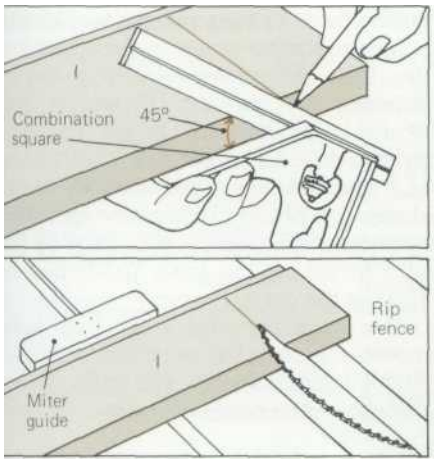
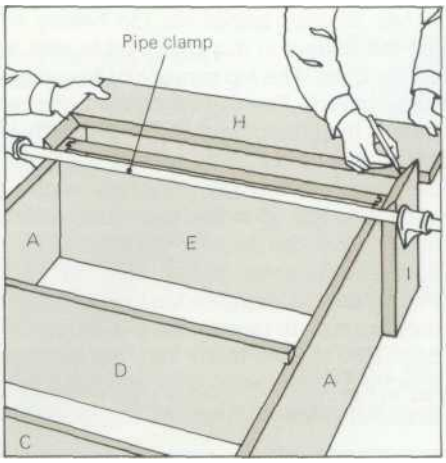
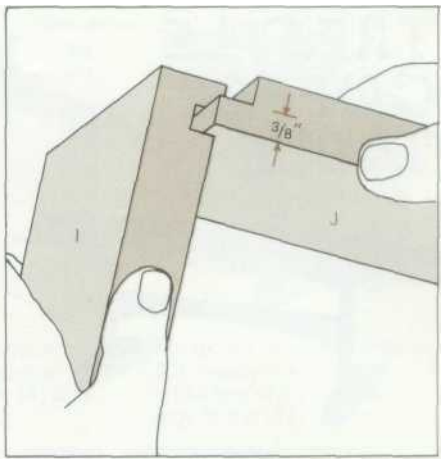


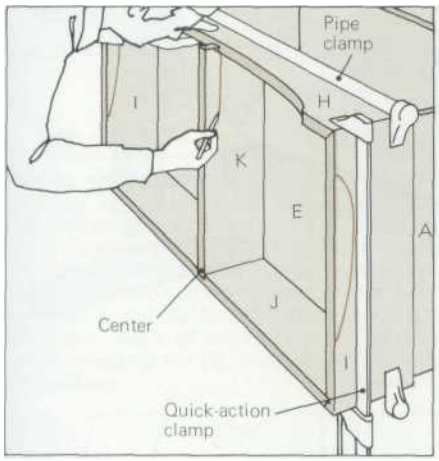
10. Cut 45° bevels on front end of each plinth side (I) and one end of front (H) For accurate cuts, scribe edge of wood first with combination square; set table saw to 45° and cut 1/16 in too long, then shave to line, adjusting blade if needed Check cuts with square



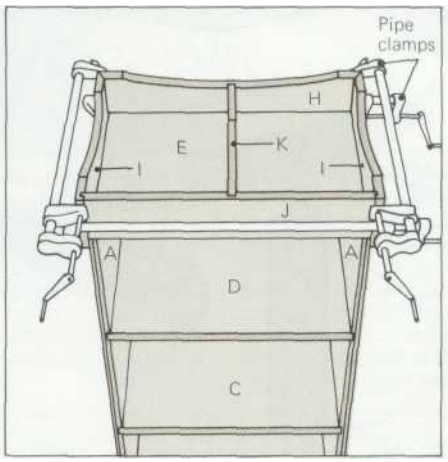
11. Clamp plinth sides (I) to shelf unit so beveled ends align with front of unit Fit plinth front (H) by holding beveled end against one side bevel and marking other end; cut overlong. then shave a little at a time until both mitered joints fit snugly Cut sides to length



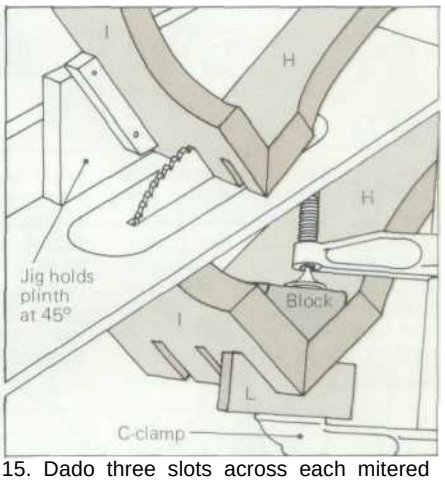
12. Rip and plane stock for plinth back (J) and spacer (K) to width of unrabbeted portion of sides. Cut plinth back to length Rabbet both rear corners, leaving tongues 3/8 in thick Mark and cut dadoes in plinth sides (I) to fit (See Steps 1 and 2.)



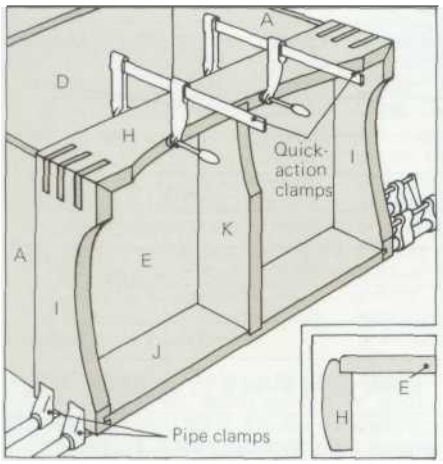
13. Cut dadoes to receive spacer 1/4 in deep across center of inner faces of plinth front and back Clamp plinth pieces in place around shelf unit and cut spacer to fit between dadoes Scribe and rough-cut cutouts on plinth front and sides and front end of spacer.



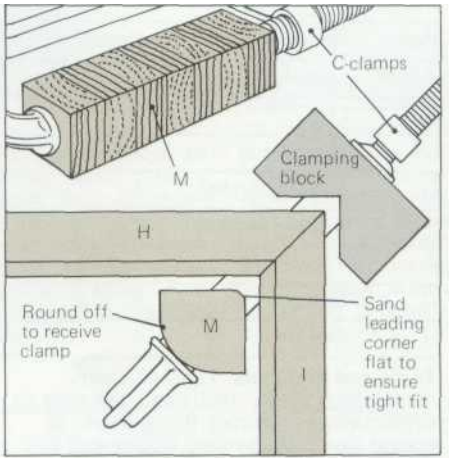
14. Rub wax on front corners of shelf unit. Then, after establishing clamping procedure with a dry run. apply a thin coat of glue to all mitered ends and clamp plinth together around shelf unit. (Put back and spacer in place for clamping, but do not glue them)



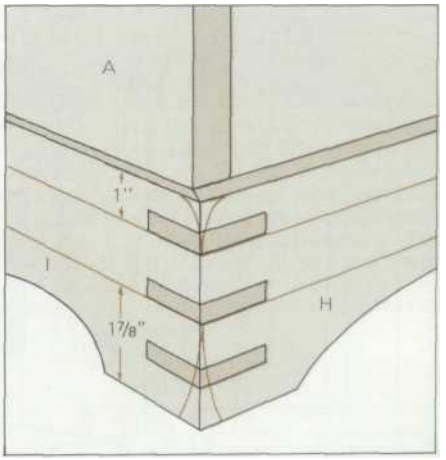
15. Dado three slots across each mitered corner, using scrap wood to set width and depth of saw. Cut splines (L) square to length of slots. Apply glue Use a C-clamp to force each into its slot When glue dries, saw splines parallel to wood surface; plane flush



16. With rasp and sandpaper, shape inner edges of plinth sides and front, finish shaping cutout sections, and round front edge of bottom piece (E). Clamp plinth to unit, gluing tongues of back (J) into their dadoes. When dry, glue and clamp spacer (K) in place.



17. Glue corner block laminates (M) in stacks, alternating grain direction. Saw to lengths needed Glue and clamp into joints of plinth. When glue is dry, begin shaping plinth First, rule lines along face of front (H) and sides (I) 1 in. from top edge and 1 7/8 in from bottom.



18. Trace pattern for rounding plinth onto both faces of front corners and onto rear edge Plane to desired shape Complete shaping all edges with No. 80 sandpaper, then sand with Nos 120 and 220. Finish shelf unit, plinth and back, then screw back in place

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13

EARLY AMERICA BOOKCASE

This Early American bookcase is versatile enough to blend with almost any decor. If you eliminate the decorative molding, the bookcase is not only easier to build, but it will also fit in with most modern or traditional furnishings. As shown, the bookcase is 7 feet high, 30 inches wide, and about 12 inches deep, but its design can be varied to suit your needs. The bookcase can also be used as a unit in wall-to-wall bookcases.

If you plan to build wall-to-wall bookcases, omit the molding supports where the sides of two units meet, since the moldings will get sufficient support from the adjoining sides. You can also omit the mitered joints and the side sections of the crown and baseboard moldings.

Construction: Begin the construction of the bookcase by cutting and assembling the shell. Cut the two sides (A), bottom (B), and top (C) of the shell from three 8-foot-long 1 x 12's. The top and bottom pieces fit into dadoes in the sides of the shell. The plywood back (E) is fitted into rabbets in the sides. (Directions are given in Steps 4-8 for cutting dadoes and rabbets with a circular saw. Before you assemble the shell, you must drill holes for the shelf supports at uniform 2-inch intervals. It is very impor-tant to space the holes properly, other-wise the shelves will not hang evenly. To avoid problems, use a homemade template as described in Step 9.

After the top, bottom, and sides are assembled, use the actual dimensions of the shell as a guide for cutting the shelves (D), the plywood back (E), the moldings (F-K), and the molding supports (L). Cut the shelves from two 8-foot-long 1 x 12 boards. Make each shelf 3/16 inch shorter than the interior width of the assembled shell and test-fit the first shelf before cutting the other five.

If you do not wish to use the exact moldings shown on the following page, you can substitute other moldings, but be sure to use moldings of the same width as those indicated in the chart, or adjust the measurements accordingly. Cut the shelf molding (F) from two 8-foot lengths. Cut the other molding and molding supports from 7-foot lengths of the appropriate material. Order extra molding to allow for possible errors in mitermg. You may want to substitute simple 3-inch baseboard molding for the crown moldings (J and K), as the latter require an extra-deep miter box in order to be cut.

Never apply clamps directly to the surface of wood or they may leave unsightly marks. Always cushion the clamp by placing bits of scrap wood between the clamp and the good wood.

Before applying stain to the finished bookcase, test it on a piece of scrap wood. The longer you leave the stain on the wood before wiping off the excess, the darker the wood will become, so experiment on scrap wood in order to get the shade you prefer on the finished unit.

Parts list

Part	Name	Quantity	Thickness	Width	Length	Material
A	Side	2	¾"	11½"	82"	1 x 12 knotty pine
B	Bottom	1	¾"	11¼"	29"	1 x 12 knotty pine
C	Top	1	¾"	11¼"	29"	1 x 12 knotty pine
D	Shelf	6	¾"	10⅛"✲	28⅝"✲	1 x 12 knotty pine
E	Back	1	¼"	29¼"✲	78½"✲	Birch plywood
F	Shelf molding	6	—	⅞"	26⅞"✲	Pine
G	Front baseboard molding	1	—	3½"	30½"✲	Pine
H	Side baseboard molding	2	—	3½"	11½"✲	Pine
I	Fluted molding	2	—	1½"	77"✲	Pine
J	Front crown molding	1	—	3"	30½"✲	Pine
K	Side crown molding	2	—	3"	11½"✲	Pine
L	Molding support	2	¾"	¾"	77"✲	1 x 1 pine

✲Measurements are approximate. Parts D–L should be measured against the assembled bookcase shell before cutting.

Tools and materials: Circular saw with adjustable blade depth or table saw or radial arm saw. Electric drill with set of twist bits. Backsaw, deep miter box. Orbital sander (optional). Combination square, framing square, steel tape rule, pencil. Four 5" C-clamps. Hammer, nail set. Paintbrush. Wood putty. Nos. 80, 100, 150, and 220 sandpaper, 0000 steel wool, oil stain, satin finish polyurethane, turpentine, paste wax, carpenter's glue. Tack cloth, soft cloths. Wood and molding (see above) and 3" x 82" scrap of 1/4" pegboard Box of 3/4" 19-gauge wire brads. 3d, 4d, and 6d finishing nails, 3d common nails. Twenty-four metal shelf rests.

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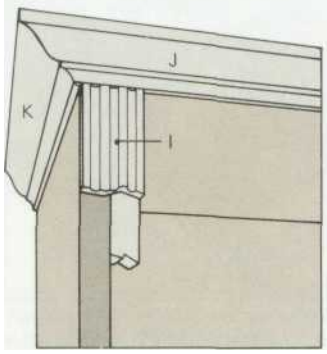
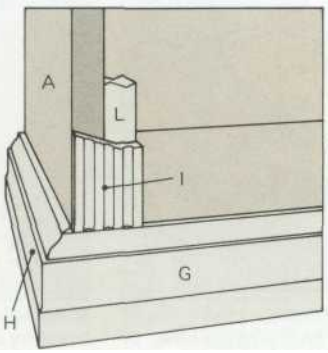
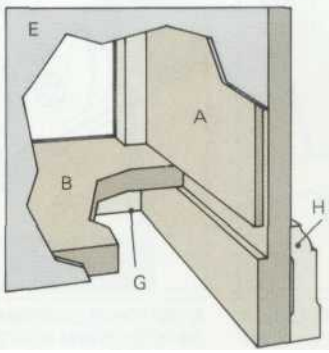
Decorative moldings



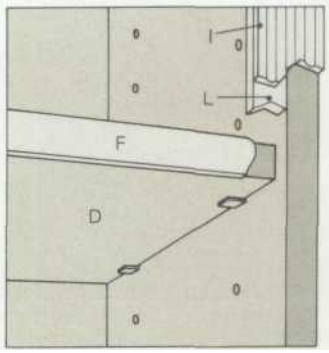
The fluted moldings (I) on the front edges of the bookcase meet the flared crown moldings (J and K) at the top corners.



The fluted moldings (I) also meet baseboard moldings (G and H) and are attached to bookcase sides (A) and supports (L).



The bookcase back (E) fits into the rabbets cut into bookcase sides (A); it is flush with lower edge of bookcase bottom (B).



Each shelf (D) is faced with 7/8-in. pine molding (F) that fits with a small clearance against supports (L) at each side.

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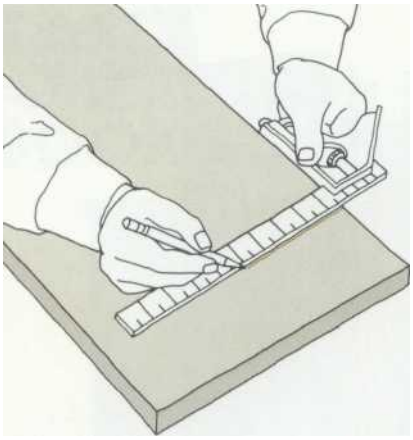
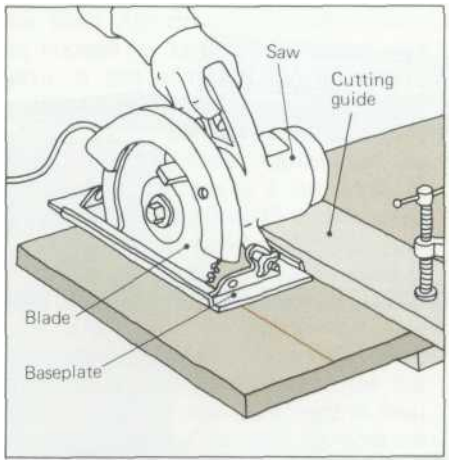
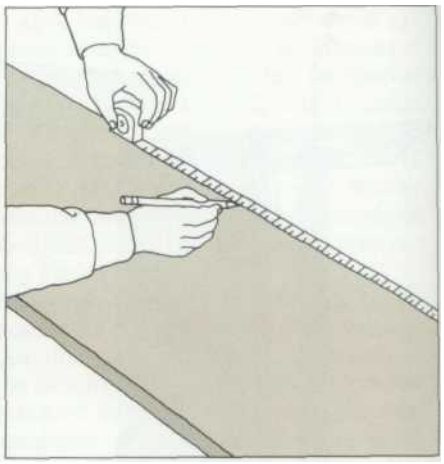


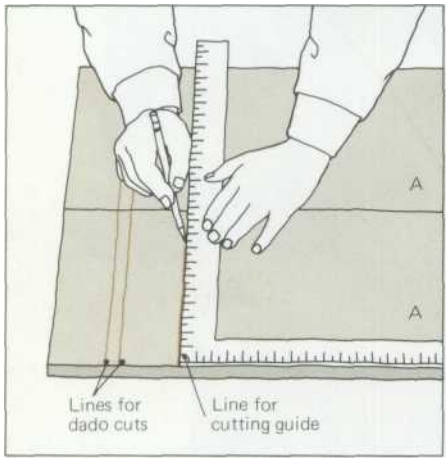
1. Cut 1/4 in from width of lumber for bookcase bottom (B) and top (C) using a circular saw with a rip blade and a guide (see Step 2). Use a combination square and pencil to draw a squared-off line for first crosscut near ends of this lumber and lumber for sides (A).



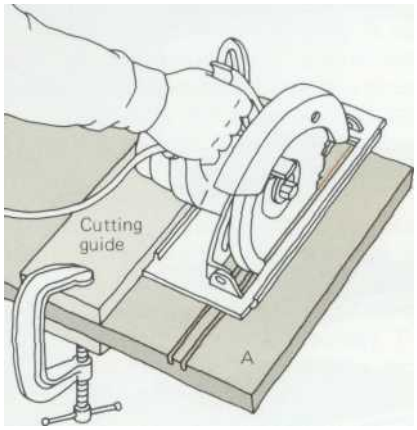
2. Use a circular saw with a crosscut blade to cut along the line Clamp a straight strip of wood to the piece being sawed to act as a cutting guide; the distance between guide and cutting line must equal the distance between the saw's baseplate and blade.



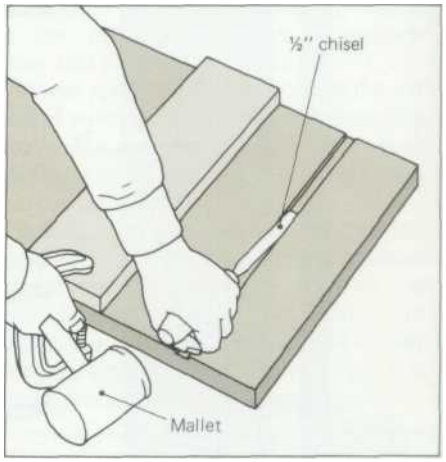
3. Following the dimensions given in the chart, measure the correct distance from the squared end of the board to the next cut, then use combination square to draw a line for the next crosscut and cut along it. Label each piece as you cut it for easy identification.



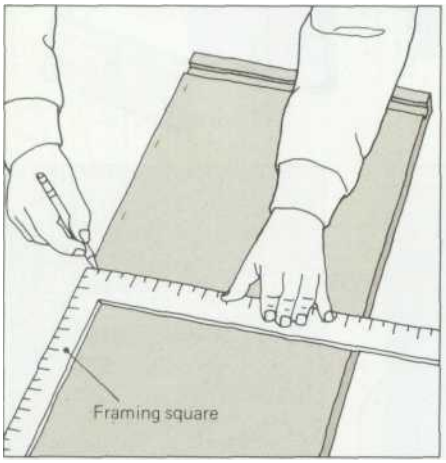
4. Lay the sides (A) side by side. Draw cutting lines for the bottom dadoes across both sides 2 3/4 in. and **3 1/2** in. from one end. Set the blade of the circular saw to cut to a depth of 1/4 in. and cut dadoes between the pairs of cutting lines into one side at a time (Steps 5 and 6).



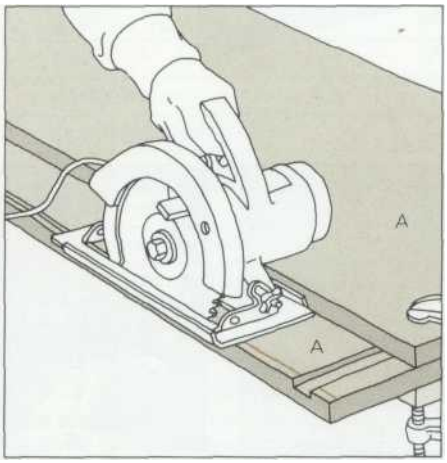
5. Clamp a scrap-wood cutting guide to each side (A), in turn, so that when the baseplate of the saw butts against the guide, the saw blade is just inside one rule. Cut along the rule. Move the guide and cut along the other rule. Make several parallel cuts between these two



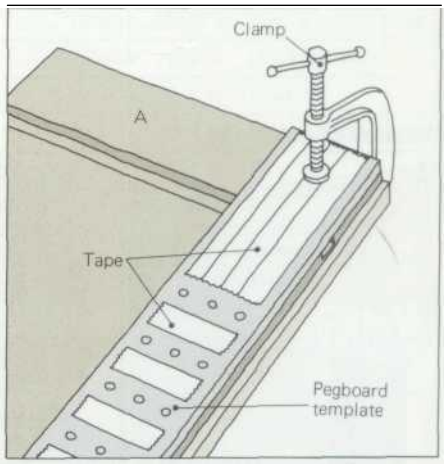
6. Remove the waste wood with the saw or with a chisel and mallet. Measure and mark off cutting lines for the top dadoes 3/4 in. and 1 1/2 in. from the opposite ends of the side pieces Cut 1/4i-in.-deep dadoes between these pairs of cutting lines as you did for bottom dadoes.



7. Use a framing square and a pencil to mark off points along the inside of the two bookcase sides (A) 1/4 in. from the back edges. Draw rules through these points from top dado to bottom dado to serve as cutting lines for the rabbets the plywood back (E) will fit into.



8. Set the circular saw blade for a 3/8-in.-deep cut. Clamp one side (A) on top of the other to serve as a cutting guide and cut along the rule. Reposition the cutting guide and cut the remaining wood from the edge. Repeat this process to cut the rabbet on the other side.



9. Make a template for drilling shelf-support holes by cutting a scrap of 1/4-**in.** pegboard 3 in. wide by 82 in. long with a row of holes at its exact center. Clamp template to the front inside edge of one bookcase side (A). Block alternate rows of holes with tape

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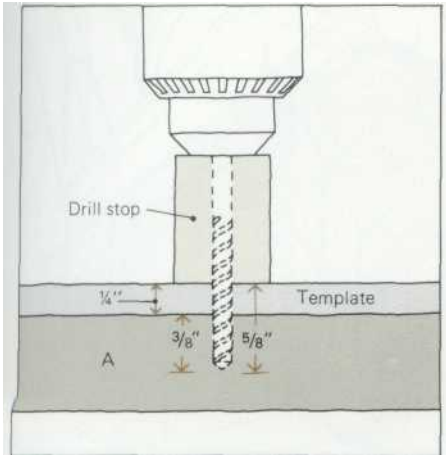
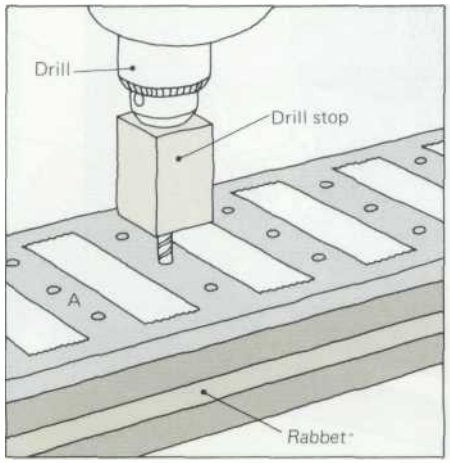
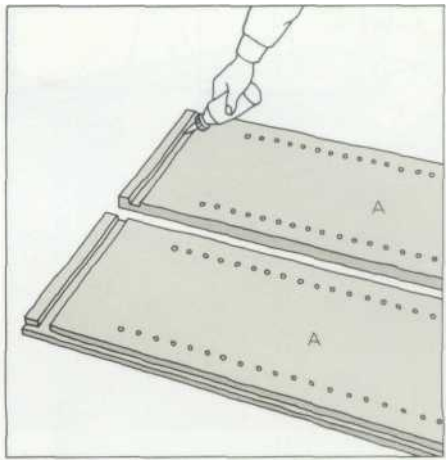


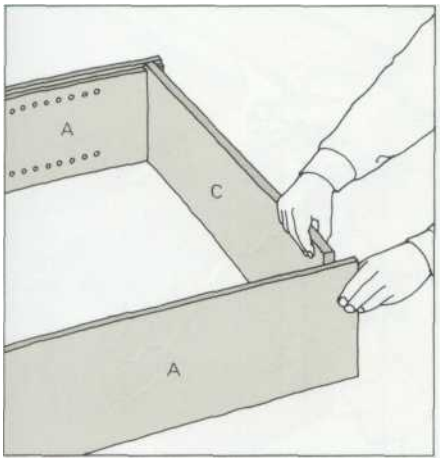
10. Make a drill stop by cutting a piece of scrap wood so that when the drill goes through it, 5/8 in. of the drill protrudes, excluding its point. This will allow the drill to pass through the Win. template and bore exactly 3/8 in. into the side (A).



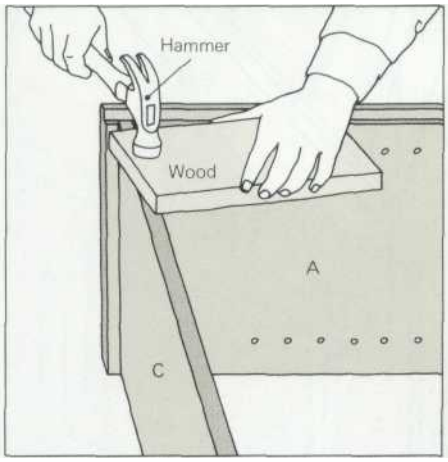
11. Drill into the center holes of the untaped rows in the template. Slide the template to the back edge of the side (A) and drill into the same holes. Move the template, with the same side facing up and its ends pointing in the same direction, to the second side.



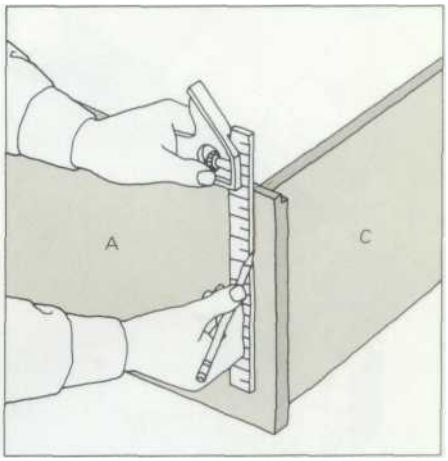
12. Bore shelf-support holes into the second side (A) as you did into the first Sand the inner portions of the sides, bottom (B), and top (C) with Nos. 80, 100, and then 150 sandpaper Lay out the sides, inner portions up, and apply glue to the dadoes



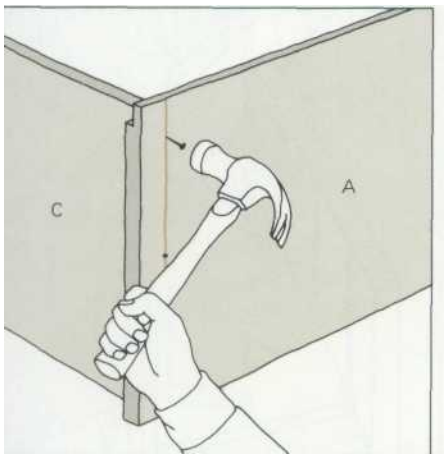
13. Be sure to apply enough glue to completely cover the bottoms and sides of the dadoes, then fit the bookcase bottom (B) and top (C) into the dadoes of one side (A) and then the other. (Position the bookcase shell with the rabbets facing up.)



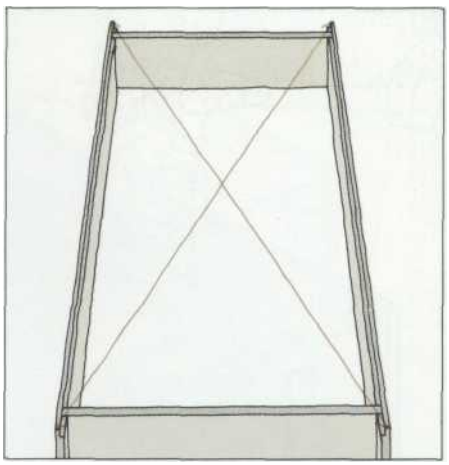
14. Before glue dries, wipe off all excess with a damp cloth. Align the top and bottom of the bookcase with the back edges of the dadoes by tapping them gently near the joints with a hammer that is buffered with a piece of wood, as shown, or with a mallet.



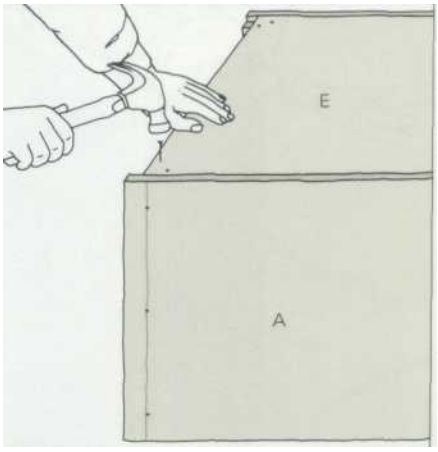
15. Mark the center of the top and bottom dado joints on the outside of the bookcase sides. Use a combination square and pencil to extend each mark along each side, forming rules that can be used to guide the proper placement of the reinforcing nails



16. Nail the bookcase sides (A) to the bookcase bottom (B) and top (C) with 6d finishing nails. Use about three nails for each joint and drive them in along the guide rules that were drawn in Step 15. Use a nail set and hammer to set all the nails



17. Check the bookcase shell for squareness by measuring its front from the upper lefthand corner to the lower right and the upper right to the lower left. If the two measurements are not identical, the bookcase is not square. Adjust the squareness before the glue dries.



18. Get exact measurements for the bookcase back (E) from the shell, cut the plywood accordingly, and sand one side with Nos 80, 100, and then 150 paper Position back over shell, sanded side down, and nail each of its corners to shell with two 3d nails.

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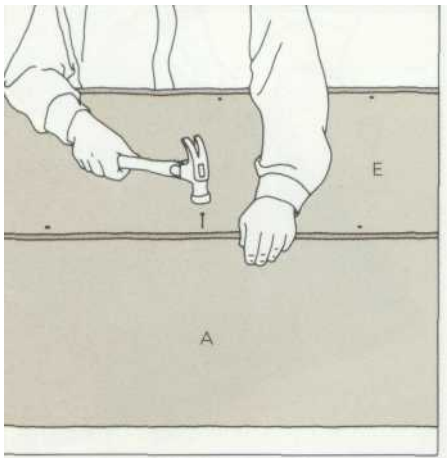
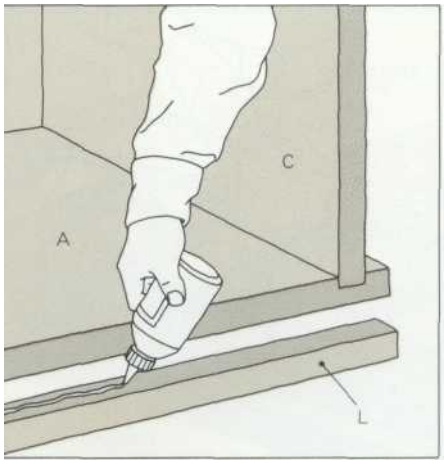
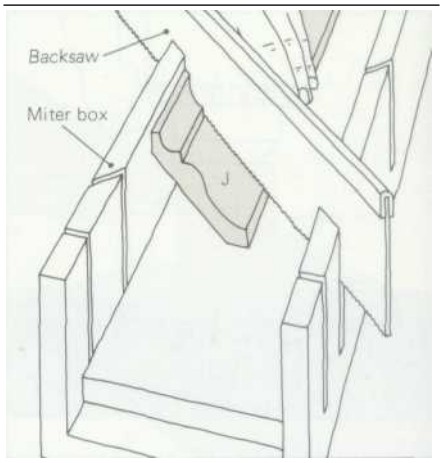


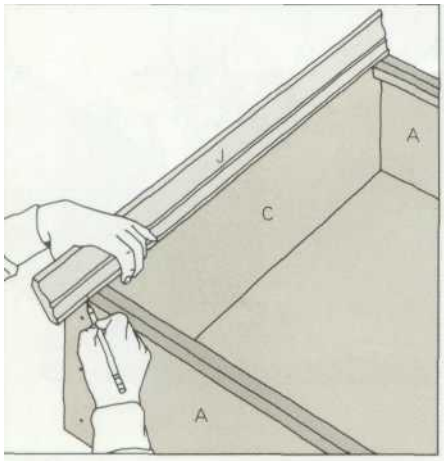
19. Drive more nails through the back into the sides, bottom, and top of the bookcase. Use one nail about every 8 in. If the bookcase sides bow out, pull them inward as you drive the nails home along the center portions of the sides. Do not set the nails



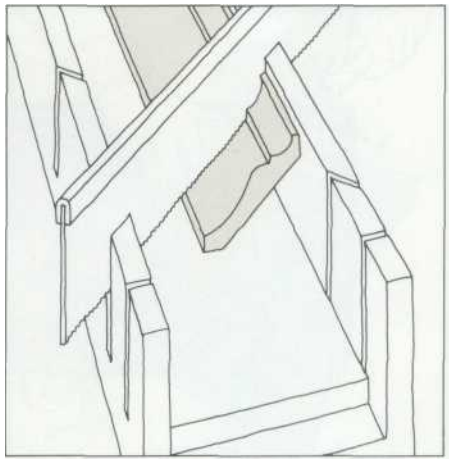
20. Measure and cut the molding supports (L), and then glue and nail them to the inside front edges of the bookcase sides (A), These will support the thin fluted moldings that run down the front of the bookcase Use 3d finishing nails and set them.



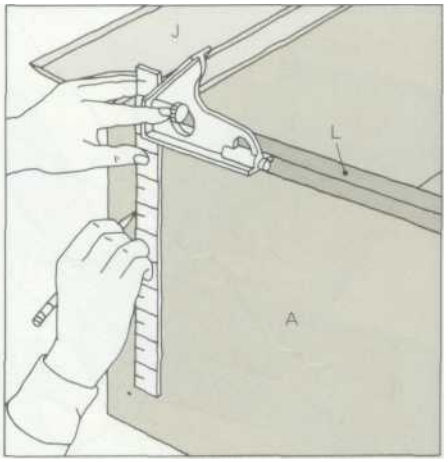
21. Clamp a length of crown molding (J) into a deep miter box with the top of the molding facing down. Angle the molding, as shown, with its bottom flush against the side of the box and its top against the floor of the box. Make a 45° miter cut with a backsaw



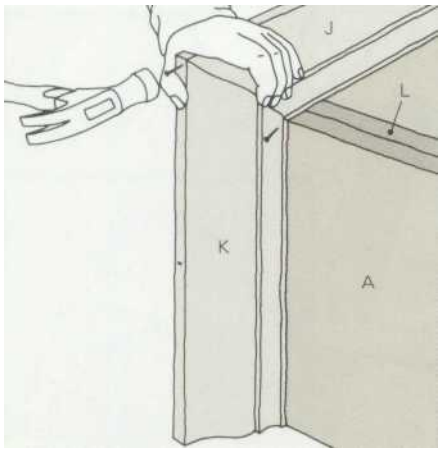
22. Place the cut piece of crown molding against the top of the bookcase shell, with the shorter cut corner of the molding against one front top corner of the shell, Mark the molding for the second miter cut where it meets the other side of the bookcase shell.



23. Return the molding to the miter box, but this time place it against the opposite side of the box with the cutting mark against a saw slot that runs in the opposite direction from the first. Hold the molding firmly in place and make the second miter cut.

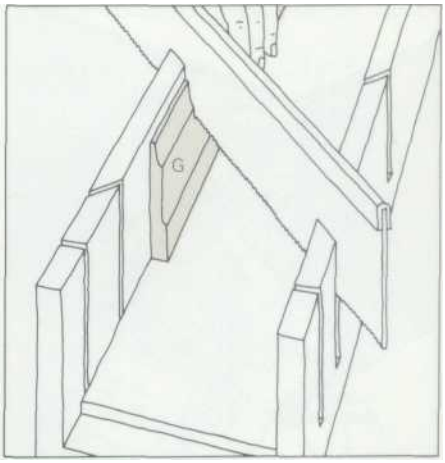


24. Glue and nail the mitered molding to the top of the bookcase with 4d finishing nails, but do not drive the nails all the way in. Use a combination square to draw rules on the sides of the bookcase to extend the bottom line of the front molding (J) along the sides (A)



25. Measure the side crown moldings (K) against the bookcase and cut miters in one side. Cut the opposite side flush with the back of the bookcase. Rub glue into the mitered edges and position the side moldings on the bookcase and nail them on.

26. Align the mitered joints and carefully wipe off all the excess glue with a well-dampened cloth. (The stain will not penetrate the glue, so it is important to remove all the excess.) Drive all the nails home and use a nail set and hammer to set them.



27. Measure, mark, cut, and attach the front and side baseboard moldings (G and H) as you did the crown moldings in Steps 21 -26, but when cutting the miters in the baseboard moldings, hold each molding flush against the side of the miter box, as shown here.

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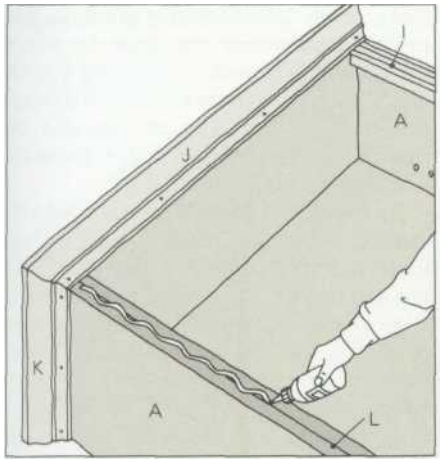
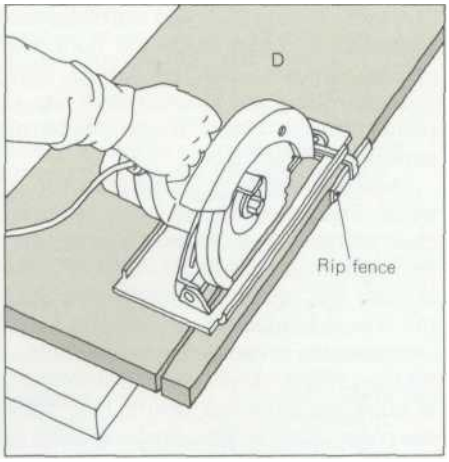
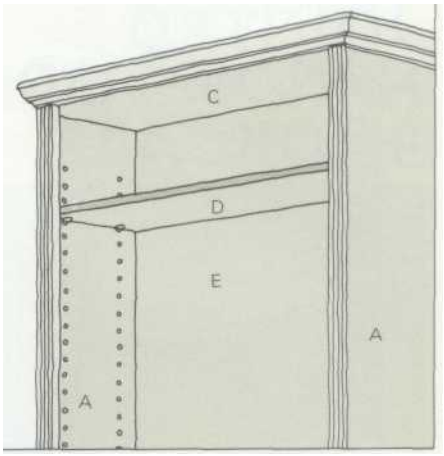


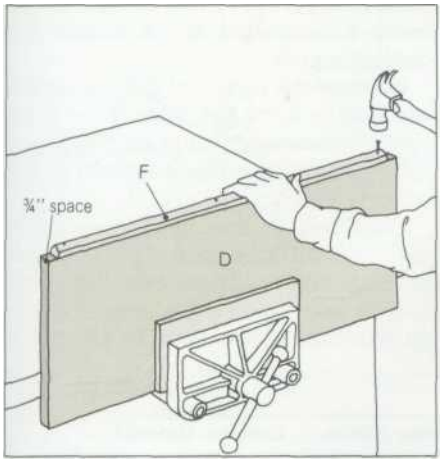
28. Measure the fluted moldings (I) against the sides of the bookcase and cut them. Glue them to the sides and molding supports, and wipe off the excess glue with a damp cloth. Nail the moldings down with 3/4-in. 19-gauge wire brads. Set the brads.



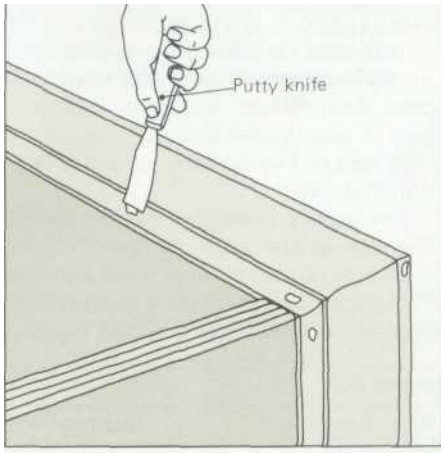
29. In order to fit properly, the shelves (D) must be narrower than the boards they are cut from Use a circular saw with a rip blade and rip fence to cut the boards to a width of 10 1/8 in. Set fence for amount of wood to be removed and cut along length of each shelf.



30. Measure the inside width of the bookcase and cut the first shelf 3/16 in. shorter than the measurement you get. Test-fit shelf by placing it into position. It should fit in easily without forcing. Adjust your measurements, if necessary, and cut the other five shelves

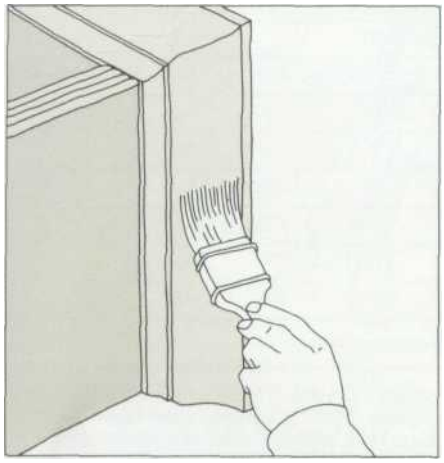


31. Clamp each shelf to the workbench, in turn, with the front edge up Measure the shelf molding (F) against the shelf, leaving 3/4 in. on each side. Cut the molding, and glue and nail it to the shelf with 4d finishing nails Set the nails with a nail set.

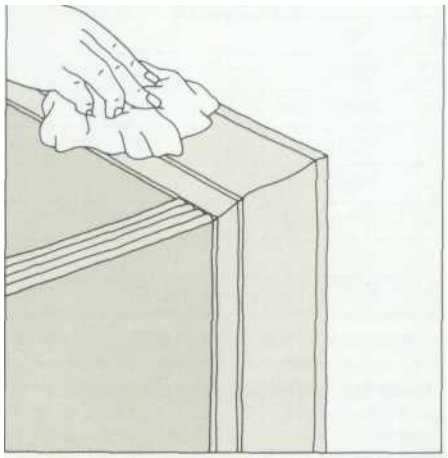


32. Fill all the holes left by these nails with putty. Use your finger or a small putty knife to work the putty firmly into the holes. Leave the putty a little higher than the surface of the wood; it will shrink as it dries, and if it is still too high, you can sand it down.

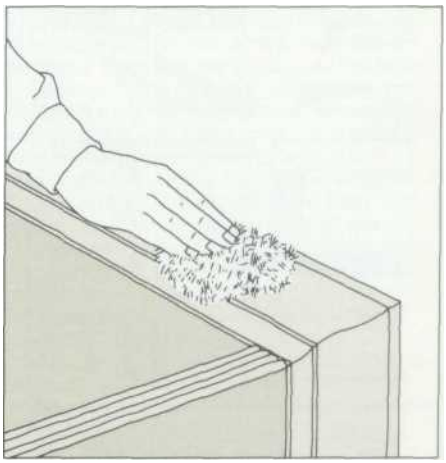
33. When the putty is dry, sand the bookcase and shelves with Nos. 80, 100, and then 150 sandpaper. When sanding moldings, use No. 100, then No. 150 paper and bend it around your finger. When sanding near mitered joints, sand away from joints along molding.



34. Brush the sanded bookcase and shelves with a tack cloth to remove the sawdust created by the sanding. Use a small brush to paint on the stain. Let the stain sit for 10 min., and then wipe off the excess with a clean, soft cloth. Let the stain dry for 24 hr.



35. So that the first coat of polyurethane penetrates more deeply, brush on a coat of sealer made up of 70% satin polyurethane and 30% turpentine. Wipe off the excess after 10 min. After 4 hr. brush on a coat of full-strength polyurethane. Let it dry for 24 hr.



36. Sand all surfaces lightly with No 220 sandpaper, then remove the sawdust with a tack cloth. Brush on another coat of full-strength polyurethane and let it dry for 24 hr Apply paste wax with 0000 steel wool using medium pressure. Buff with a soft cloth.

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ROLLTOP DESK

For the person who hates to clear off a desk, who wants to leave everything where it is overnight yet still have the clutter hidden, a rolltop desk is a godsend. The tambour hides everything! Our design, a modern interpretation of the 19th-century design, goes well with contemporary or traditional furnishings.

Lumber-core plywood is used for most of the desk, supplemented by solid hardwood stock: walnut, maple, oak, or cherry. The edges of the plywood are covered with a matching veneer tape.

The need for extreme accuracy in measuring and cutting cannot be stressed too strongly. With one exception, all the construction is ambitious but straightforward—that exception is the tambour, which is made up of thirty 3/4-inch-wide hardwood slats. A scant 1/4-inch tongue at

Parts list

Part	Name	Quantity	Thickness	Width	Length	Material
Tambour case						
A	Side	2	¾"	15½"	30¼"	Plywood
B	Back	2	¼"	14⅝"	56"	Plywood
C	Top	1	¾"	11½"	56"	Plywood
D	Rail	1	¾"	⅞"	55½"	Plywood
Cubbyhole unit						
E	Top	1	¾"	10"	55½"	Plywood
F	Shelf	1	½"	9¾"	28¾"	Plywood
G	Shelf	4	½"	9¾"	10¼"	Plywood
H	Side	2	½"	9¾"	12¼"	Plywood
I	Back	1	¼"	12¼"	55½"	Plywood
J	Divider	2	½"	9¾"	12¼"	Plywood
K	Divider	5	½"	9¾"	3⅛"	Plywood
L	Divider	2	½"	9¾"	8¼"	Plywood
M	Cleat	1	¾"	¾"	55½"	1 x 6 hardwood
Tambour						
N	Handle	1	1½"	1⅝"	56"	2 x 8 hardwood
O	Slat	30	¾"	¾"	56"	1 x 6 hardwood
P	Retaining strip	1	¼"	1"	55½"	1 x 6 hardwood
Q	Backing	1	—	23⅝"	55½"	Canvas
Desk-top unit						
R	Top	1	¾"	29¼"	60"	Plywood
S	Bottom	1	¾"	29¼"	59"	Plywood
T	Side	2	¾"	5½"	29¼"	Plywood
U	Back	1	¼"	4¾"✲	59¼"✲	Plywood
V	Partition	2	¾"	4½"	29"	Plywood
W	Horizontal trim	2	¾"	¾"	60"	1 x 6 hardwood
X	Side trim	2	¾"	¾"	5½"	1 x 6 hardwood
Y	Partition trim	2	¾"	¾"	4¼"	1 x 6 hardwood
Z	Spline	2	⅛"	¾"	29¼"	1 x 6 hardwood
Base units						
AA	Top	2	¾"	16"	26¼"	Plywood
BB	Bottom	2	¾"	16"	25½"	Plywood
CC	Front	2	¾"	3¾"	16"	Plywood
DD	Side	4	¾"	24½"	27½"	Plywood
EE	Back	2	¼"	16¼"✲	24⅛"✲	Plywood
FF	Pin	8	¼" dia.	—	¾"	Hardwood dowel

✲Measurement is approximate; cut to fit during construction.

Tools and materials: Radial arm or table saw with carbide-tipped or planing blade and dado head. Saber saw. Router with 1/4" straight bit and 5/8" cove bit. Drill with 1/4" twist bit. Hammer, mallet, screwdriver. Two web clamps. Framing square, steel tape rule. Orbital sander and sanding block with Nos. 100, 150, and 220 sandpaper. Hide or resin glue, adhesive sponge. Wood stain, varnish, paste wax. Candle stub. 1 2/3 yd. of canvas at least 26" wide. Veneer tape. Lumber-core plywood: one panel 1/4" x 4' x 8', 1 1/2 panels 1/2" x 4' x 8', three panels 3/4" x 4' x 8'. A 1/8" x 4' x 8' panel of tempered hardboard. Six 5' lengths of 1 x 6 hardwood boards, one 5' length of 2 x 8 hardwood board One 1/4" dowel. Four 1/4" dowel centers. Nine pairs of drawer slides (metal or hardwood). A 55 1/2" length of weather stripping. Four 1/2" No. 6 brass wood screws, four 1 1/2" No 10 brass

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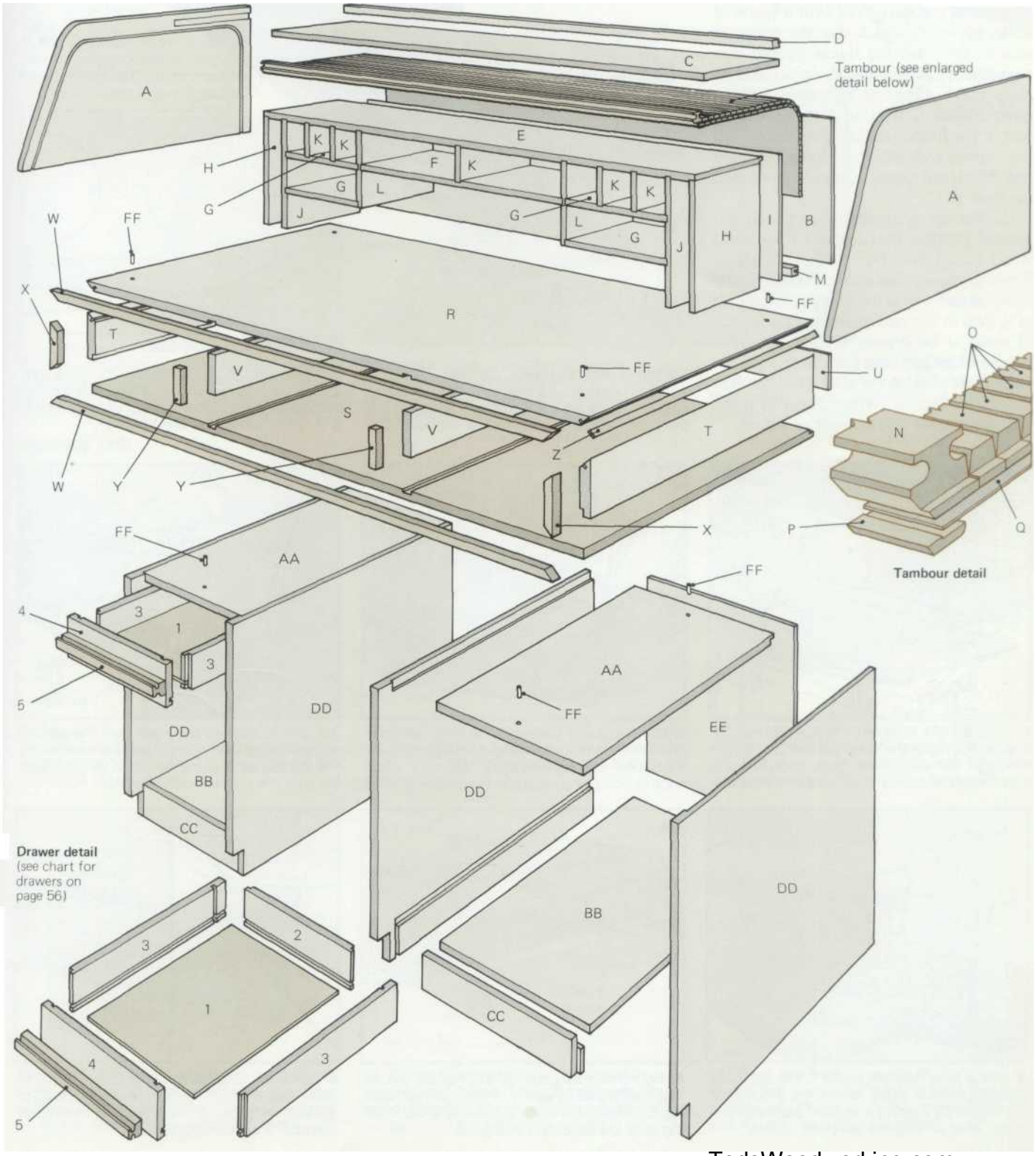
each end of each slat allows the tambour to slide up and down in 1/4-inch grooves that have been routed in the sides of the tambour case (see diagram, p. 55). Where the grooves curve, they will have to be widened a bit to accommodate the width of the slats as they make the turn.

The tambour slats should be finished and waxed before they are glued to the canvas backing; it would be impossible to finish them once they are glued down. However, do not finish the bottoms of the slats; these must accept the glue.

The finish you choose depends on the hardwood you select for the desk. For light woods, such as oak or maple, you may want to apply a stain, followed by varnish and wax. But darker woods may need no more than light sanding and tung oil.

You may find it easier to finish the individual sections of the desk—the tambour and case, desk-top unit, base units, drawers, and cubbyhole unit—before assembly. If so, take extra care during assembly that you do not mar the finish. Build the cubbyhole unit after the tambour case has been built and fitted to the desk top in order to be sure that the cubbyhole unit fits perfectly within the case.



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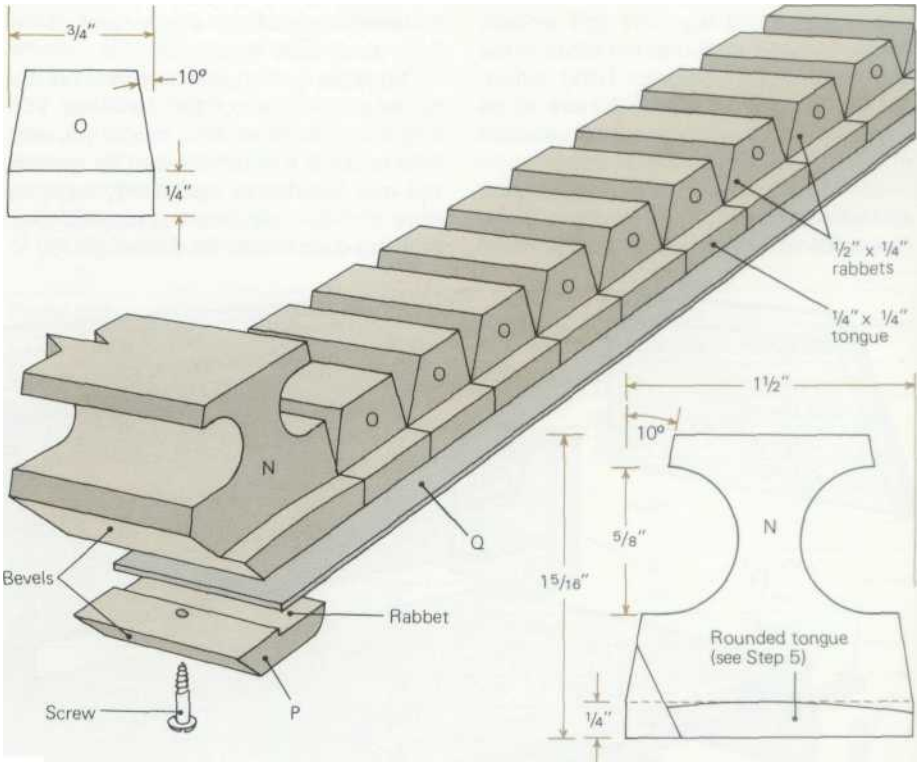
Tambour and case

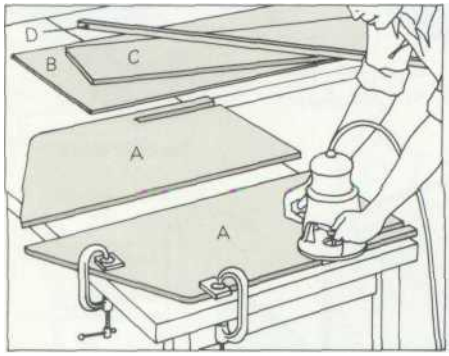
Cut 30 slats (O), 3/4 inch square and 56 inches long, from 1 x 6 hardwood boards. Set the table saw blade at a 10° angle and position the fence so that the blade will cut a 10° bevel, ending 1/4 inch above the base of each slat. Cut a rabbet 1/2 inch deep and 1/4 inch wide into each end of each slat. Finish the slats.

Build a frame of scrap lumber with inside dimensions of 25 x 56 inches. Stretch the canvas tightly over a piece of scrap plywood; check that the frame is square, then nail the frame through the canvas and to the plywood. Apply hide or resin glue to a third of the canvas and put down 10 slats. Clamp the slats against one end of the frame, holding them down on the canvas with weights. When the glue has dried, put down 10 more slats, then the final 10,

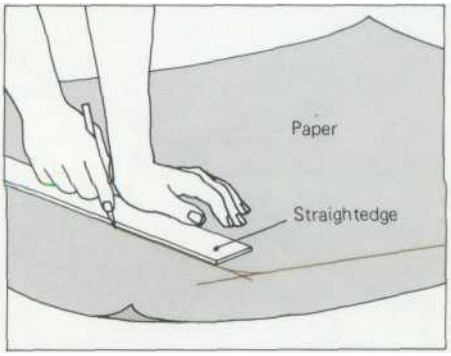
Cut slats for the tambour handle (N) and drawer handles by ripping a 2 x 8 hardwood board into l 1/2- x l 5/16-inch strips. Bevel as shown. Use a 5/8-inch cove router bit to cut grooves in the handles to a depth of 1/2. inch in two passes, removing 1/4 inch of wood at each pass. Cut the tambour handle 56 inches long and cut a rabbet in each end to match the slats. Glue the handle to the canvas. When the glue dries, trim the canvas to the tambour edges.



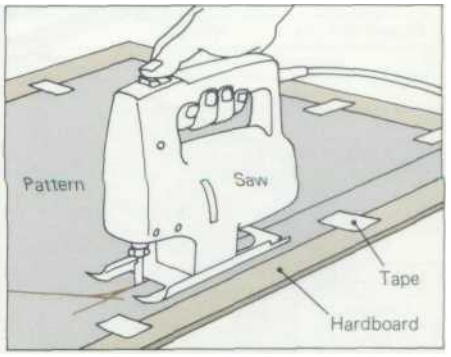
Tambour detail shows canvas (Q) sandwiched between handle (N) and retaining strip (P). Bevel front edge of strip to match the bevel on handle. Cut a shallow rabbet in the retaining strip to accommodate the thickness of the canvas. Finish the lower side of the strip, then glue it to the canvas. Drill pilot holes and screw parts N and P together



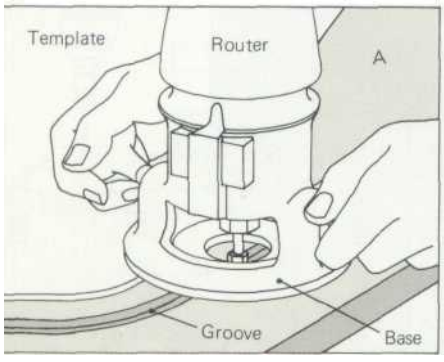
1. Cut sides (A), back (B), top (C), and rail (D) to size. Following the diagram at top of opposite page, cut a 1/4 x 3/4-in. blind dado in each side for top and 1/8- x 3/8-in. rabbet for back.



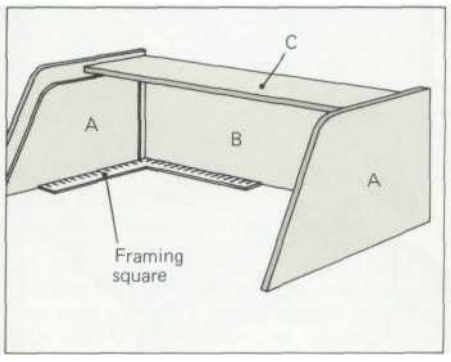
2. Make a paper pattern for cutting tambour grooves with a router and template guide (see illustration, opposite page), allowing clearance needed by your guide



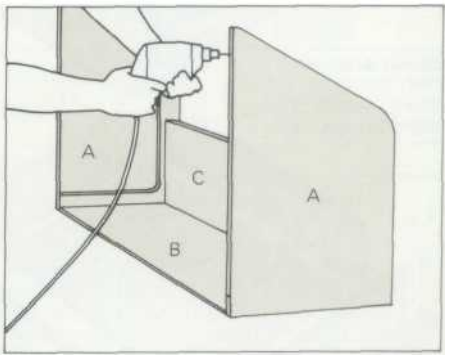
3. Cut a hardboard template from the pattern, using a saber saw. A 2-in. radius is needed on the curves so that the tambour will not bind Be sure the curves flow smoothly.



4. Use a 1/4-in, straight router bit to cut 1/4-in.-deep grooves in sides. Widen the grooves at the curves by making a second pass with the router after shifting the template slightly



5. Round the tongues on the handle (N) so that it will travel smoothly in the grooves. Glue top to sides. Glue back to sides and top, making sure the assembly is square.



6. Nail back to sides and top. Glue rail (D) to sides and top. Drill 1/4-in. holes 1/4 in, deep in the bottom edges of the sides 2 in. from back corners, 6 in. from front

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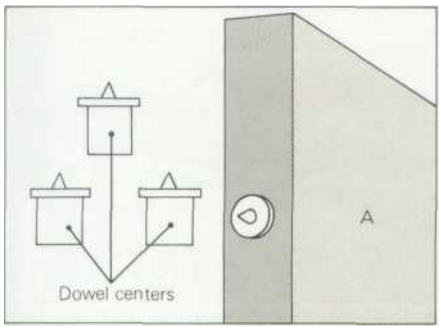
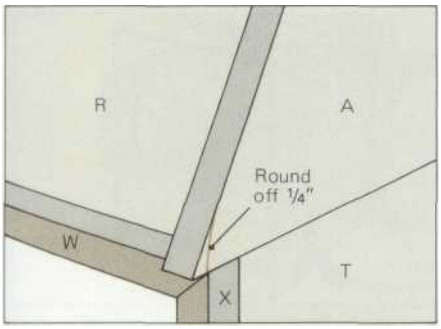
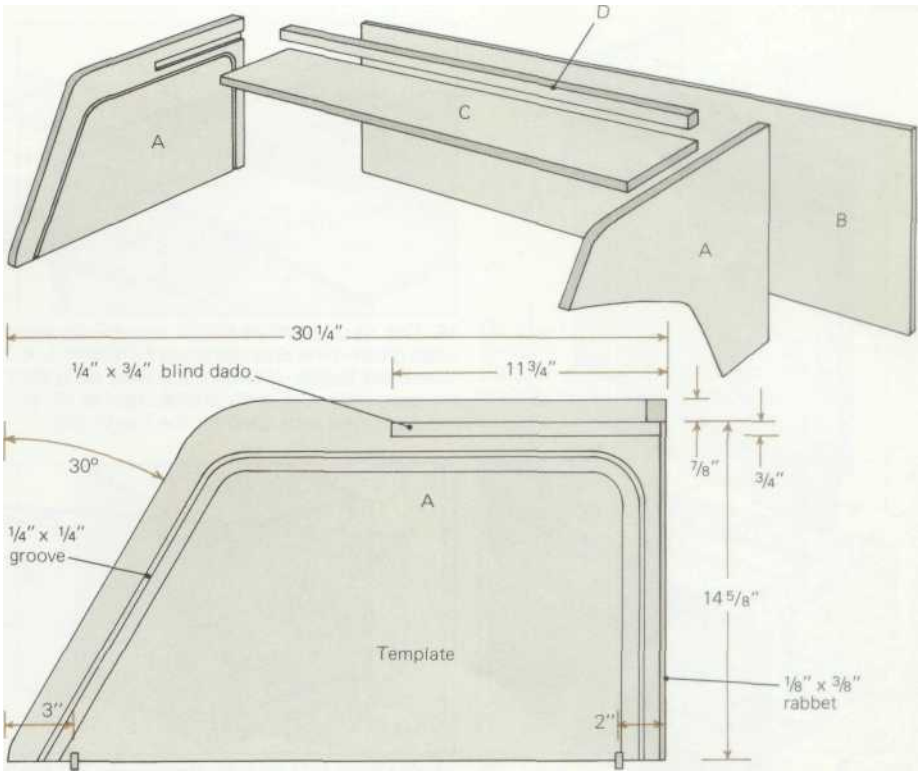


7. Purchase four Win, dowel centers to insert into the holes drilled in Step 6. These will be used in Steps 23-26 to mark the positions of the dowel holes in the desk top.

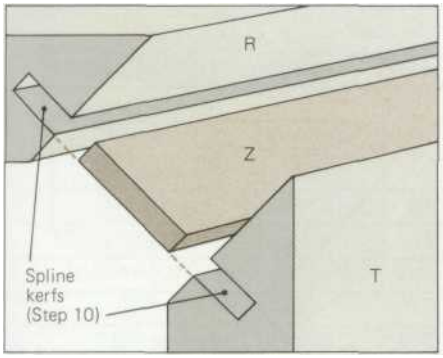


8. After completing desk-top unit (below), position tambour case on desk top (R). Round off front corners of case flush with top. Apply veneer tape to exposed plywood edges.

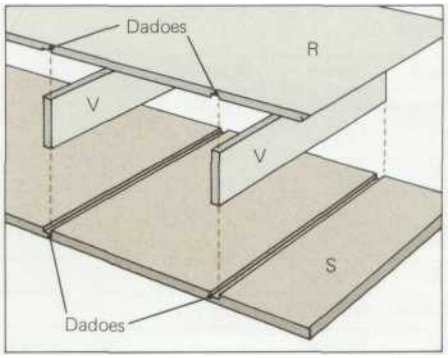


Drawings show assembly of parts for tarnbour case (top) and dimensions and locations for dowel holes, dado, and rabbet (bottom), The template for cutting the grooves in the sides (A) must be made to conform to the thickness of the template guide for your router . Use a 2-in radius for the curves of the grooves

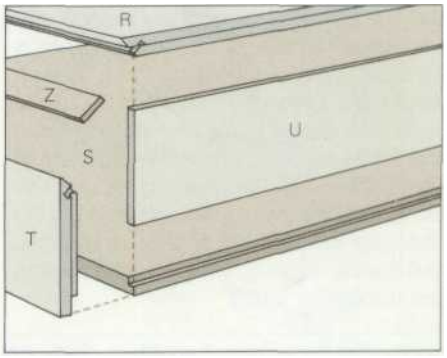
Desk-top unit



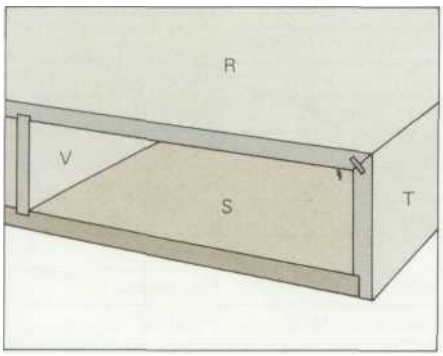
9. Cut parts R-Z to size (see chart, p.52), but do not cut the back (U) yet. Grain must run the length of splines (Z). Cut 45° bevels in top (R) and sides (T) as shown



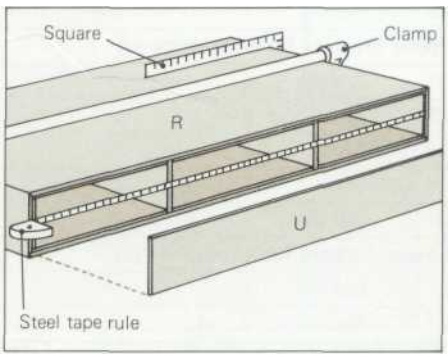
10. Cut 1/8-in.-wide spline kerfs 3/8 in. deep into the top and sides Cut dadoes 1/4 in. deep and 3/4 in. wide into the bottom (S) and top (R) for partitions (V).



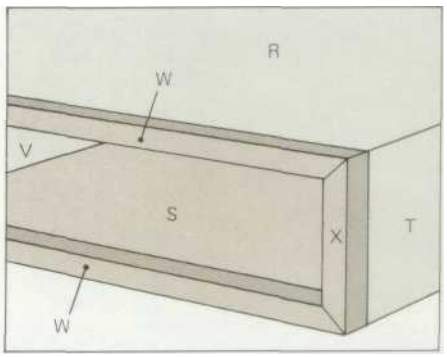
11. Cut a 1/4- *x 3/4*-in. rabbet into the bottom edges of the sides (T) to accept the bottom (S). Cut a $^{3}/_{8}$- x 1/4-in rabbet into the back edges of parts R, S, and T for back (U)



12. Test-fit all pieces, check for squareness, make adjustments; assemble with glue. Glue splines (Z) to top and sides (T); glue partitions (V) to top Glue bottom to parts T and V

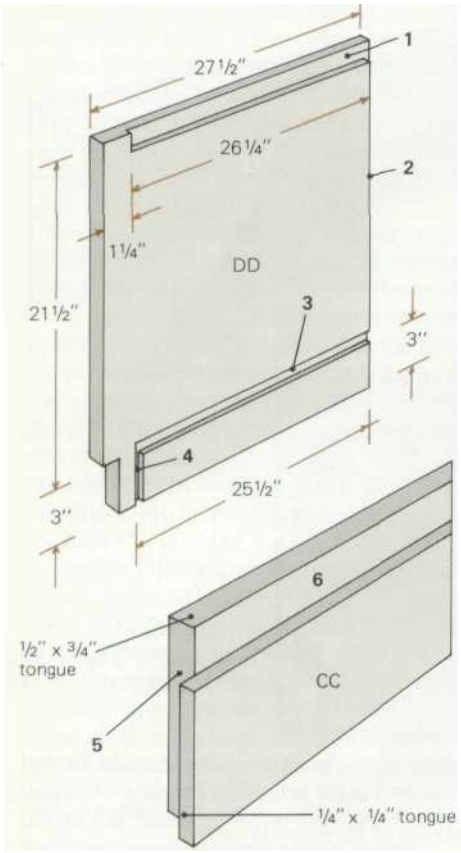


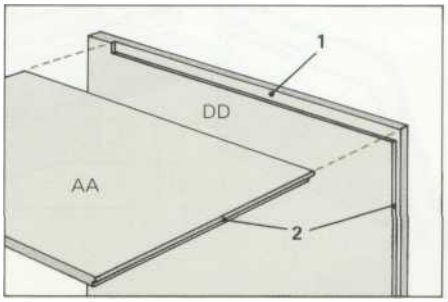
13. Clamp assembly, making certain front is square, and brace it diagonally with scrap wood. Measure opening inside rabbets, then cut back (U) to fit opening exactly



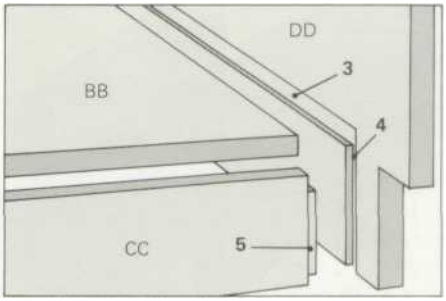
14. Glue the back to parts R, S, T, and V. Check that assembly is still square and nail back piece in place. Test-fit the trim (W, X and Y), then glue trim in position.

Base units

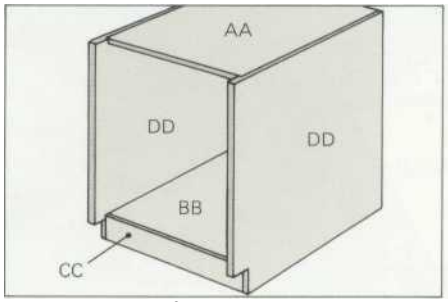




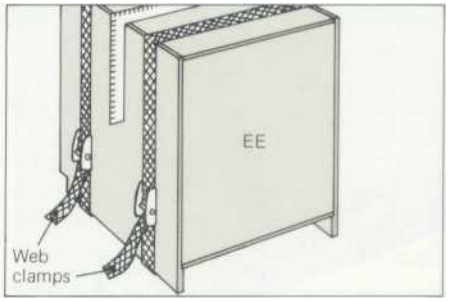
15. Cut base parts (AA-DD and FF) to the sizes given in the chart on page 52. Cut a 1/4- x 3/4in.blind rabbet (1) into each side (DD) for the tops (AA). Cut a 3/8- x 1/4-in. rabbet (2) in the sides and tops (AA) for the backs (EE).



16. Cut a 1/4- x 3/4-in. blind dado (3) into the sides for the bottoms (BB). Cut a 1/4- x 1/4-in. dado (4) in the sides for the fronts (CC) Cut a 1/4- x 1/2-in. rabbet (5) at each end of the fronts (CC) to make 1/4- x 1/4-in. tongues



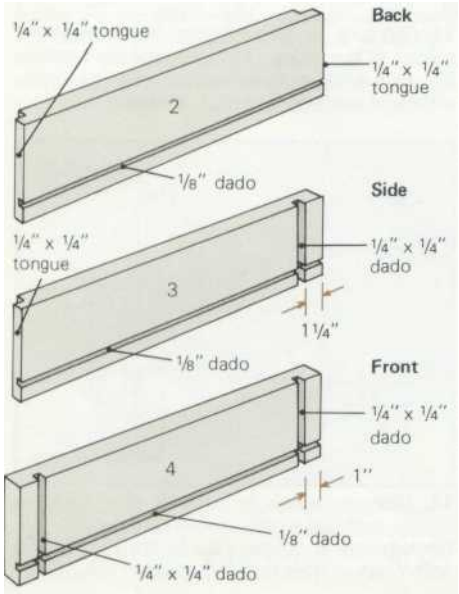
17. Cut a *1/4-* x 3/4-in. rabbet (6) along the top of each front (CC). Test-fit pieces and make any necessary adjustments. Glue the fronts to the bottoms; then glue these and their tops (AA) into dadoes in sides.



18. Clamp each base assembly with web clamps. Square the fronts with a framing square and prop up with diagonal braces. Measure openings and cut backs (EE) to fit. Glue and nail backs in place

Drawers

Cut the drawer fronts from 3/4-*inch* plywood, the sides and backs from /2-inch plywood, and the bottoms from /8-inch hardboard (see chart at right). Cut dadoes and rabbets into the backs, sides, and fronts, following the drawings below. The drawer handles were shaped at the same time as the tambour handle and must now be cut to length.



Parts list

Part	Name	Quantity	Thickness	Width	Length	Material
Side desk-top drawers (2)						
S1	Bottom	2	⅛"	15½"	23⅛"	Hardboard
S2	Back	2	½"	3½"	15½"	Plywood
S3	Side	4	½"	3½"	23⅛"	Plywood
S4	Front	2	¾"	4"	17"	Plywood
S5	Handle	2	1½"	1⁵⁄₁₆"	17"	2 x 8 hardwood
Center desk-top drawer (1)						
C1	Bottom	1	⅛"	21½"	23⅛"	Hardboard
C2	Back	1	½"	3½"	21½"	Plywood
C3	Side	2	½"	3½"	23⅛"	Plywood
C4	Front	1	¾"	4"	23"	Plywood
C5	Handle	1	1½"	1⁵⁄₁₆"	23"	2 x 8 hardwood
Upper drawers for base units (4)						
U1	Bottom	4	⅛"	14"	23⅛"	Hardboard
U2	Back	4	½"	3½"	14"	Plywood
U3	Side	8	½"	3½"	23⅛"	Plywood
U4	Front	4	¾"	4"	15½"	Plywood
U5	Handle	4	1½"	1⁵⁄₁₆"	15½"	2 x 8 hardwood
Lower drawers for base units (2)						
L1	Bottom	2	⅛"	14"	23⅛"	Hardboard
L2	Back	2	½"	11½"	14"	Plywood
L3	Side	4	½"	11½"	23⅛"	Plywood
L4	Front	2	¾"	12"	15½"	Plywood
L5	Handle	2	1½"	1⁵⁄₁₆"	15½"	2 x 8 hardwood

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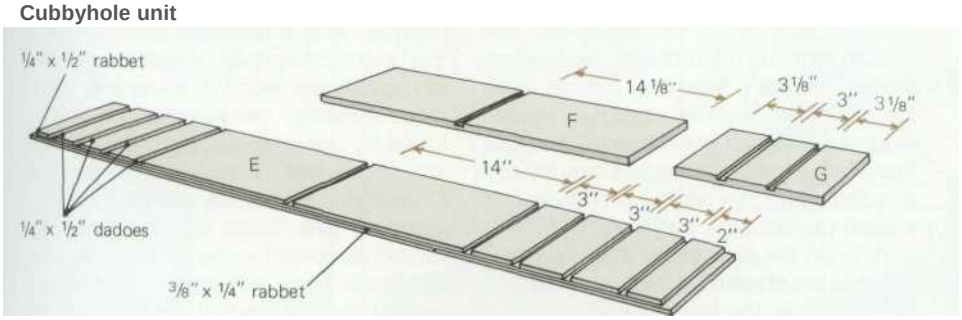
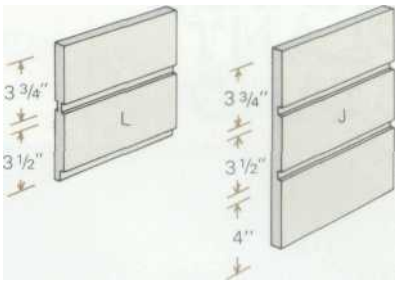
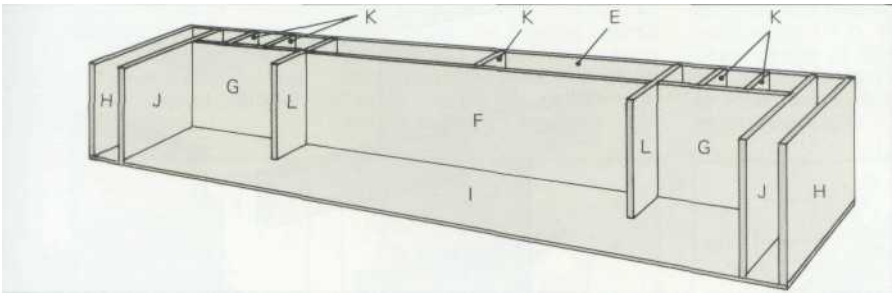
Cubbyhole unit

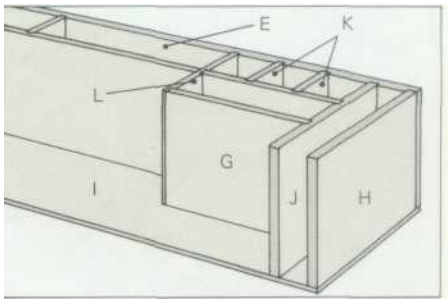




19. Cut the top (E), the shelves (F and G), the sides (H), the back (I), the dividers (J, K, and L), and the cleat (M) to size (see chart). Cut dadoes and rabbets 1/4 in. deep and 1/2 in wide into the top (E) for parts H, J. K, and L. Cut a rabbet 3/8 in. deep and 1/4 in. wide into the top for the back (I). Cut 1/8- x 1/2-in. dadoes into the shelves for dividers K

20. Cut 1/8- x 1/2**-in.** dadoes and rabbets into dividers L to receive the shelves (F and G). Cut 1/8- x 1/2-in. dadoes into dividers J for shelves G Set pieces aside

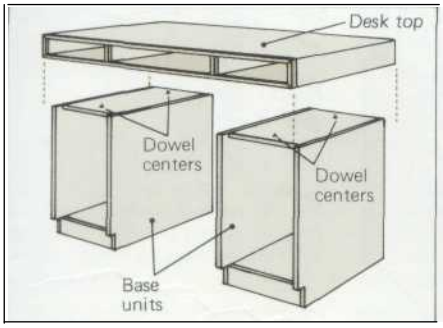


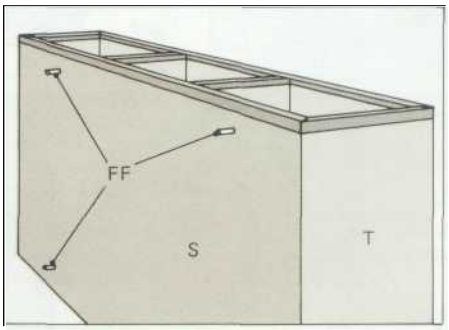


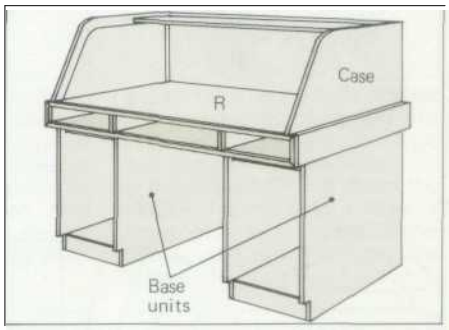
21. Test-fit all pieces and check the fit of the unit within the tambour case. Then glue and nail top (E) to sides (H). Glue back (I) to top and sides; square assembly, then nail. Glue parts L, F, and center divider K to each other and to top. Glue remaining dividers K to top, and upper shelves G to dividers K and L. Then glue dividers J to top and upper shelves G.

22. Glue remaining shelves G to dividers J and L. Square up assembly, draw center lines of parts F, G, J, K, and L on the back (I) Then nail through I into F, G, J, K, and L

Final assembly



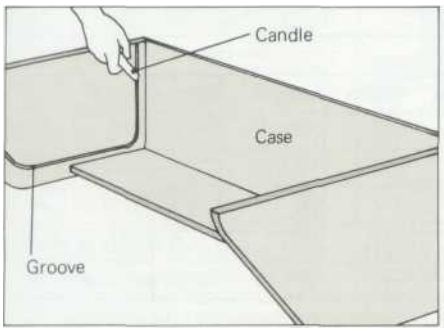


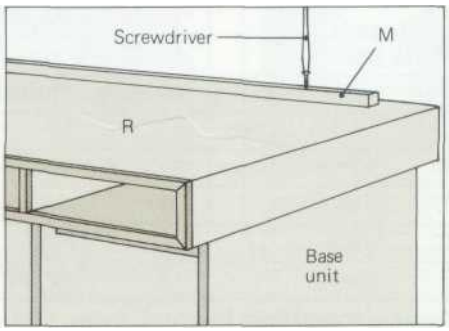


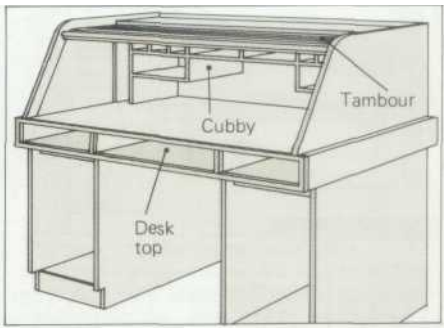
23. Drill 1/4i-in. holes 12 in. deep in the center of the base tops (AA) near the front and back edges Place dowel centers in the holes. Set base units against a wall, 23 in. apart, and carefully center desk-top unit over bases.

24. Press down on desk-top unit, then remove it; dowel centers will make marks on underside of desk-top unit Drill Win. holes 1/4 in deep at these marks. Insert 1/4- x 3/4-in. pins (FF) into holes and set desk-top unit on bases.

25. Place dowel centers into the holes drilled in the tambour case in Step 6. Lightly position the case on desk top (R). When it is in the proper position, press down firmly on the case so the dowel centers mark the top below







26. Remove the case and the dowel centers. At the marks drill four 1/4-in. holes 1/2 in. deep and insert 3/4-in,-long pins. On a clean surface invert the tambour case and rub a candle stub in the tambour grooves

27. Center the cleat (M) on the desk top (R) 2 1/2 in. from the rear edge of the top. Tape or clamp the cleat in place, drill four 7/64-in pilot holes 1 1/2 in. deep, and attach the cleat to the top with No. 10 brass screws.

28. Rub candle wax on tongues of tambour Carefully feed tambour into its case from the front. Lower the case over the pins (FF) in the desk top. Position the cubbyhole unit so that its back touches the cleat (M).

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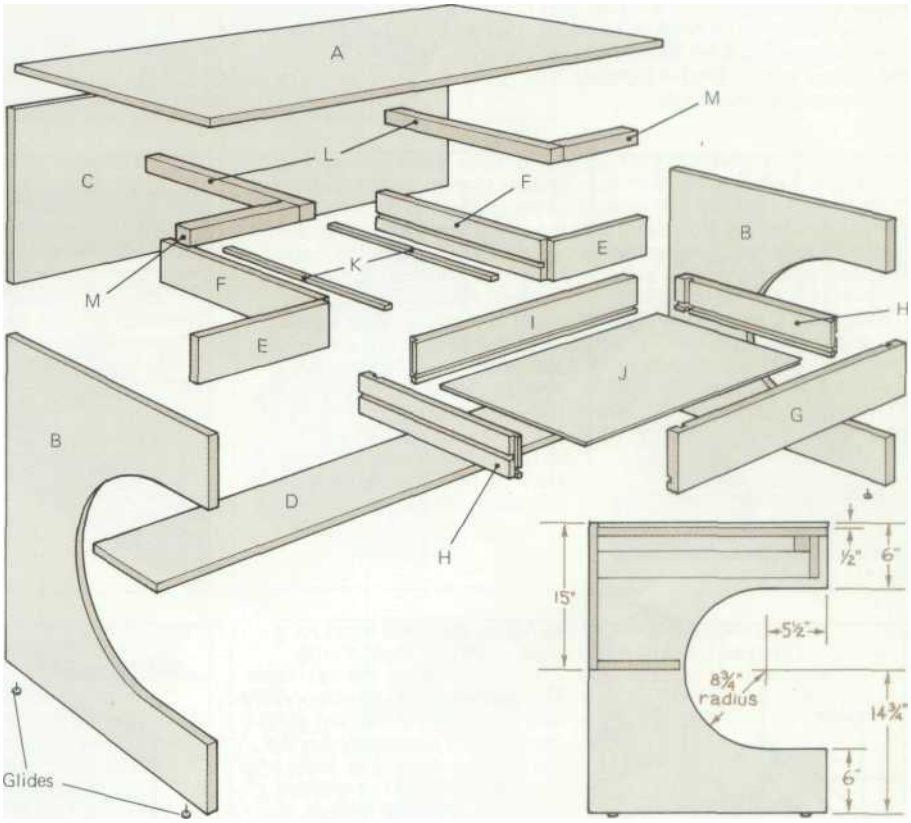
PLYWOOD DESK



Simple in design and inexpensive, this plywood desk is made from a single 4- x 8-foot panel. Plywood is available with many hardwood veneers; it can also be covered with plastic laminate, which is well suited for a work surface. Since you have many options for the materials and colors of the desk, you could use one wood veneer or one laminate throughout, mix wood veneers, or mix a wood veneer and plastic

When you cut plywood with a power saw, the better side of the wood must be kept face down so that it does not splinter as the teeth of the saw pass through it. If you use a handsaw, whose teeth cut on the downward stroke, cut the wood with the good side facing up.

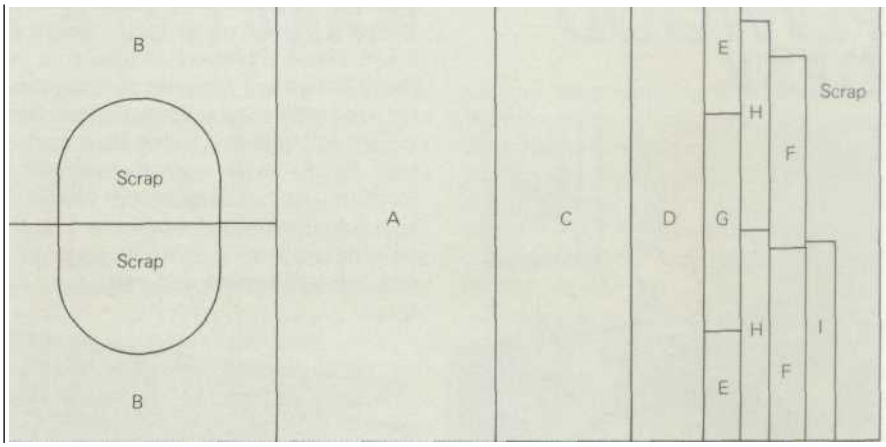
When the desk is completed, cover the exposed edges of the plywood with strips of the same laminate or veneer that cov-ers the faces of the panels.

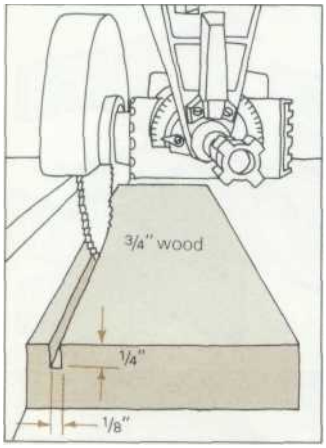
Parts list

Part	Name	Quantity	Thickness	Width	Length	Material
A	Top	1	¾"	23 3/16"	48"	Plywood
B	Side	2	¾"	23 15/16"	29½"	Plywood
C	Back	1	¾"	15"	48"	Plywood
D	Shelf	1	¾"	8"	48"	Plywood
E	Front	2	¾"	4"	12"	Plywood
F	Drawer support	2	¾"	4"	21 3/16"	Plywood
G	Drawer front	1	¾"	4"	23⅞"	Plywood
H	Drawer side	2	¾"	3¼"	23"	Plywood
I	Drawer back	1	¾"	3¼"	21¾"	Plywood
J	Drawer bottom	1	⅛"	21½"	21¾"	Masonite
K	Drawer slide	2	½"	¾"	23⅞"	Maple (or any hardwood)
L	Drawer glue block	2	1½"	1½"	21 3/16"	Maple (or any hardwood)
M	Front glue block	2	1½"	1½"	10¼"	Maple (or any hardwood)

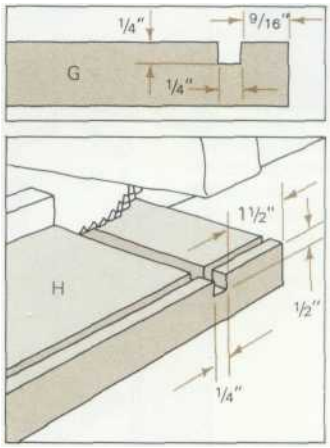
Tools and materials: Radial arm saw with a dado head and a fine-tooth blade Saber saw Electric drill with 2" Screwmate drill bit. Steel tape rule, combination square, pencil. Clamps. Screwdriver, hammer, rubber roller. Sanding block, No, 100 sandpaper Wood glue, contact cement A candle stub Veneer tape 3/4" wide. Wood (see above) Four nail-in metal or plastic glides Four doz 2" No. 10 flathead wood screws.

You can cut all plywood pieces required for this proiect from a standard 4- x 8-ft. panel of 3/4in. plywood Use a steel tape rule to measure off the widths of parts A, B, C, D, E, F, H. and I across the plywood panel Be sure to add the kerf (the thickness of the cut made by your saw blade) to each measurement Make a short test cut in the upper right-hand corner of the panel and measure its width (Or measure, mark, and cut one piece at a time, using the dimensions in the chart on page 49, and always cut just outside the pencil line on the plywood.) Use the framing square to draw cutting lines across the plywood. Measure off the lengths of parts B. E, F, G. H, and I, and use the square to mark off their edges Use a compass, yardstick, or string and nail to draw the circular part of B Use a saber saw for the curves

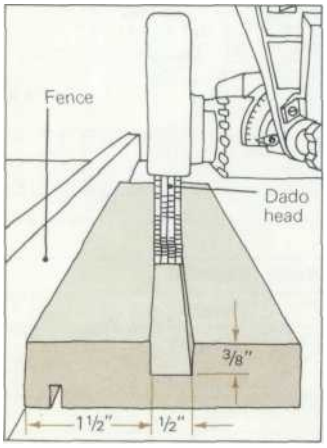




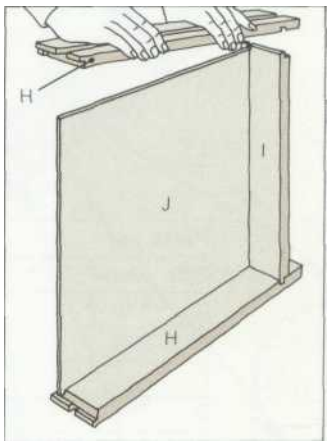
1. To make dado cuts for the drawer bottom on the four sides of the drawer (G, H. and I), fit the radial arm saw with a '1/8-in. dado head Position the dado head 1/2 in above the saw table Cut through a piece of scrap wood 3/4 thick, then measure the cut, it should be 1/8 in, wide and *1/4* in deep Make adjustments, if necessary, until part J fits snugly into the cut Then cut dadoes along the ength of the drawer sides (H), back (I), and front (G) *1/4* in from the bottom edges of each part



4. Set the dado head to make a 1/4-in.-wide cut and raise it to 1/2 in above the saw table Cut through a piece of 3/4-in. scrap wood If the tongues you made in Step 3 do not fit snugly into this dado, adjust the saw to make a dado that will fit snugly Then cut two vertical dadoes on the inner face of the drawer front (G) $^{9}/16$ in from each end Also cut one vertical dado 1/4 in. wide and 1/2 in. deep on the inner face of each drawer side (H) 1 1/2 in from the back ends



2. Ad|ust the dado head for a 1/2-in.-wide cut. Position the blade 3/8 in, above the saw table Cut another piece of scrap wood and measure the cut, adjusting the blade, if necessary, so that the cut is exactly 1/2 in, wide and 3/8 in deep Then cut dadoes along the length of the two drawer sides (H) on the faces opposite the 1/8-in. dadoes cut in Step 1, positioned 1 1/2 **in,** from the lower edges. Make identical cuts on the inner faces of the drawer supports (F)



5. To check that the drawer assembly fits snugly, slip together one side and the back and slide in the bottom (J) Then add the other side and the front If they do not fit snugly, make adjustments before you go any further Sand dadoes that are too tight; discard parts that are too loose and cut replacements When everything fits properly, pull the pieces apart and reassemble them in the same sequence, this time gluing joints as you go

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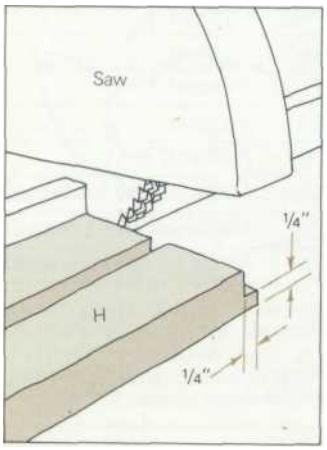
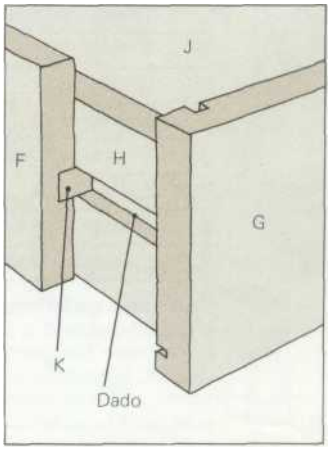
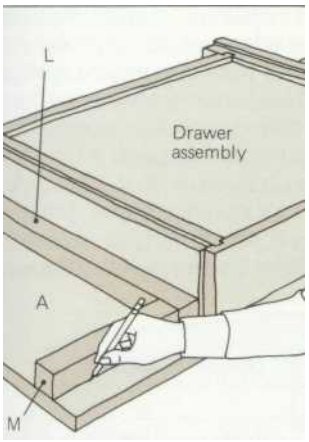


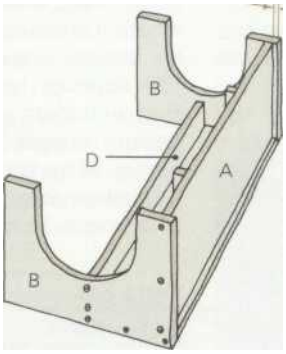
3. Cutting away a section *1/4* in. wide and 1/2 in. deep from the front ends of the drawer sides (H) and both ends of the drawer back (I) will create tongues 1/4 in thick. To do so. lower the dado head to 1/4 in above the table. Make a mark *'1/4* in. from each end of I and from the front ends of parts H Lay each drawer side flat on the table with the 1/8-in. dadoes you have already cut facing down; then cut away the 1/4 in, between your marks and the ends of the parts Lay the drawer back on the table, its Win. dado facing down, and cut 1/4-in. sections from both ends, making two tongues.



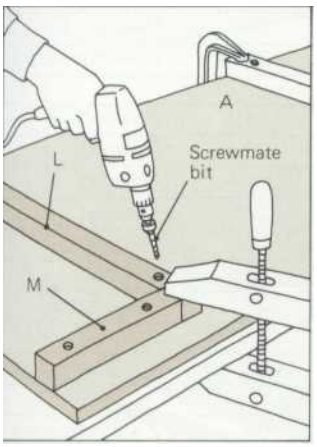
6. Fit the hardwood slides (K) into the dadoes in the drawer supports (F). They should fit snugly. If they are too tight, sand the dadoes. If they are too loose cut new slides When the slides fit properly, glue them in place After the glue dries, place the supports beside the drawer to see if the drawer sits well on the slides and can move easily along them; if not, sand down the slides Rub a candle over the slides and along the dadoes to lubricate them



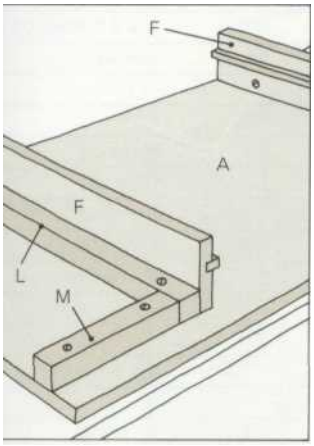
7. Place the desk top (A) upside down Place the supports and slides into the sides of the drawer, leaving a slight clearance on each side, then position this assembly carefully on the desk top. Place two glue blocks (L) beside the supports, and place the other blocks (M) perpendicular to them Mark the positions of the four glue blocks carefully on the desk top.



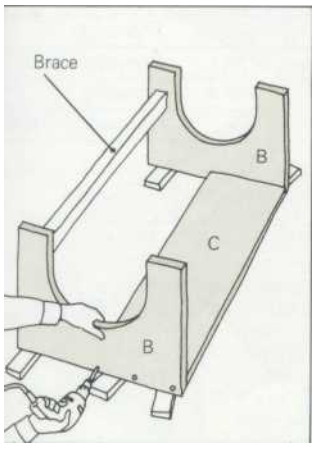
11. Prop the desk top (A) between the sides so that its top surface is vertical and 1/2 in. below the top edges of the back and sides. Drill three holes through each side and into the top, using the Screwmate bit Attach the top with six screws Turn the desk upright and drill six more holes through the back of the desk and into the top, and insert screws Put the shelf (D) in place, its bottom flush with the bottom edge of the back, and attach it to the sides in the same way as the top, using two screws on each end and six along the back



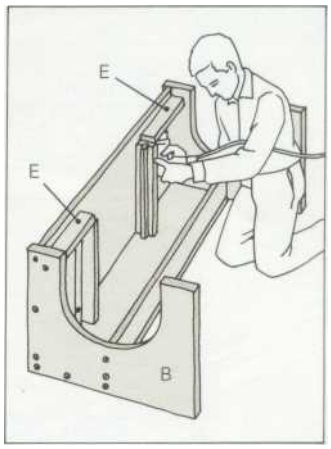
8. Remove the drawer and supports from the desk top. Align the glue blocks on the marks you just drew Use a 2-in No 10 Screwmate bit to drill countersink, clearance, and pilot holes simultaneously through each block and into the desk top. Drill holes for two screws into each glue block about 2 in. from each end.



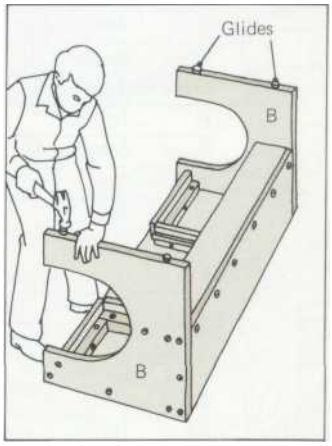
9. Spread glue on the bottom of each block, then screw all four of them to the desk top with 2-in. No. 10 flathead wood screws. Put the drawer supports (F) in place beside the glue blocks. Use the Screwmate bit to drill holes through each drawer support into the glue blocks about 4 in from each end.



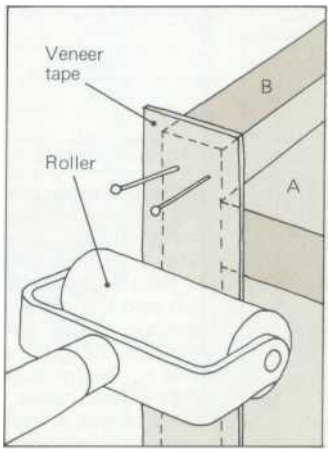
10. Lay the desk sides (B) on their back edges (so the Us face upward) with the back (C) between them. Align the edges and corners, and prop up the sides so they are perpendicular to the back, then nail a temporary brace between the sides. Drill three holes through each side into the back, using the Screwmate bit. Apply glue to the edges of the back and assemble the parts with 2-in screws. Remove brace.



12. Put the fronts (E) in place so that they rest against the glue blocks (M) and the sides (B) of the desk. Use the Screwmate bit to drill a hole through each side into the centers of the edges of the front pieces Drill one hole through the center of each glue block M into each front piece Place glue on the outside edges of the front pieces and over the faces of the glue blocks. Insert **2-in.** screws into pilot holes



13. Turn the desk onto its top, and hammer two glides into the bottom edge of each side (B) about 3 in from the front and back corners



14. Cover the cut edges of the plywood wherever they are exposed with 3/4-in. veneer tape that matches the faces of the plywood. Measure the exposed edges, cut strips of tape to the proper length, cover them with contact cement, and let cement become tacky. Carefully position the tape and press it in place with a rubber roller. If necessary, sand the tape down to the width of the plywood with No. 100 paper. Be careful not to damage the veneer on the faces of the plywood Stain and finish the veneer

Waddling Duck

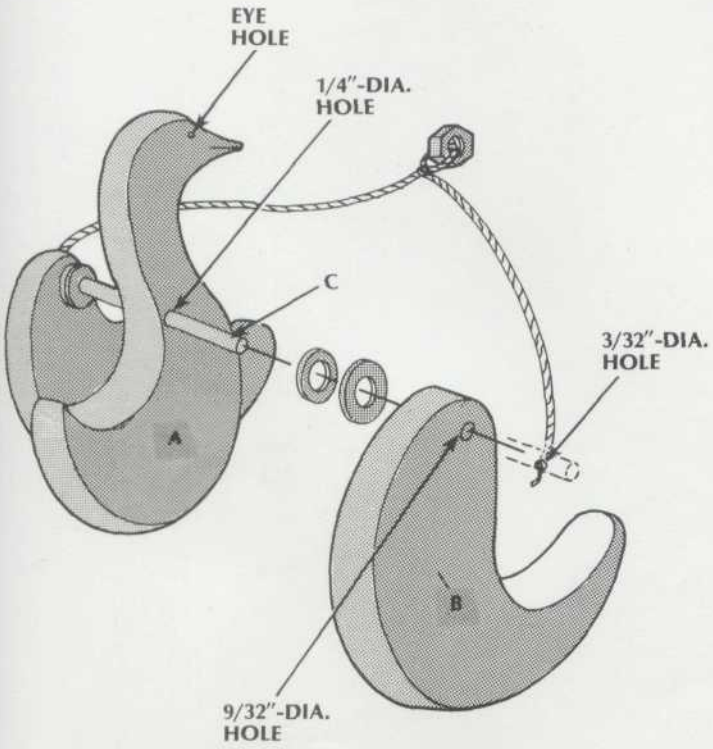
Here's a toy that's sure to fascinate children: a duck that waddles across tabletops. It's powered by a 5/8" steel hex nut that acts as a drive weight. Just hang the hex nut over the edge of a table and give the duck a nudge sideways; it will rock from side to side and walk toward the edge of the table.

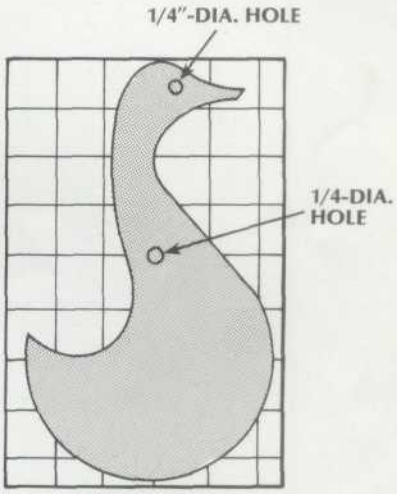
1. Make full-size templates for the body (A) and legs (B) using the patterns provided. Cut out the shapes and rout or sand all edges.
2. Drill a 1/4"-diameter eye hole and a 1/4"-diameter hole to ac commodate the leg pivot (C) in the body where indicated.
3. After cutting the leg pivot to size, drill a 3/32"-diameter hole 3/16" in from each end to accept the drawstrings.
4. Glue the leg pivot in place in the body.
5. Drill a 9/32"-diameter hole in each leg where indicated to accept the leg pivot.
6. Sand the bottom edge of each leg so that it angles 10° up toward the outside.
7. Slide two flat washers and one leg onto each side of the leg pivot.
8. Tie a drawstring to each end of the leg pivot, and tie the free ends of both drawstrings to the hex nut.
9. Finish as desired, and the duck will be ready to waddle.

LIST OF MATERIALS

(finished dimensions in inches)

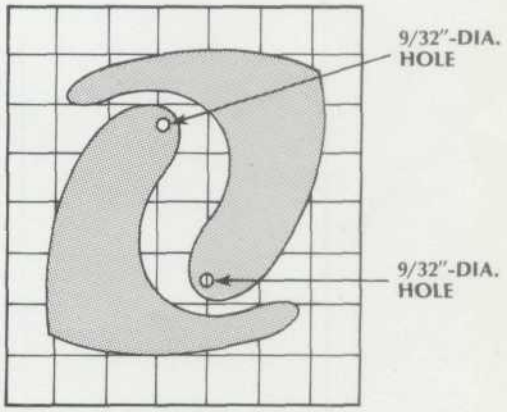
A	Body	3/4 × 5 × 8-1/2
B	Legs (2)	1-1/8 × 4-3/4 × 5
C	Leg pivot	1/4 dia. × 4
	Flat washers (4)	
	Drawstring	#18 nylon cord
	Steel hex nut	5/8
	Wood glue	





BODY CUTTING DETAIL

ONE SQUARE = 1"



LEG CUTTING DETAIL

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ROCKING HORSE

/\ rocking horse is one of those toys that never goes out of style. The one shown here is designed for sturdiness as well as stability. The runners are spread far enough apart to prevent a small child from tipping over, and the tail is left mostly connected with the body so it cannot easily be broken off. The horse shown in the photo was made from 5/4 Philippine mahogany stepping material, except for the handle, which was formed from a hardwood dowel. Substitute other woods if you like, but always use quality material for a toy that can be passed along in your family for generations to come.

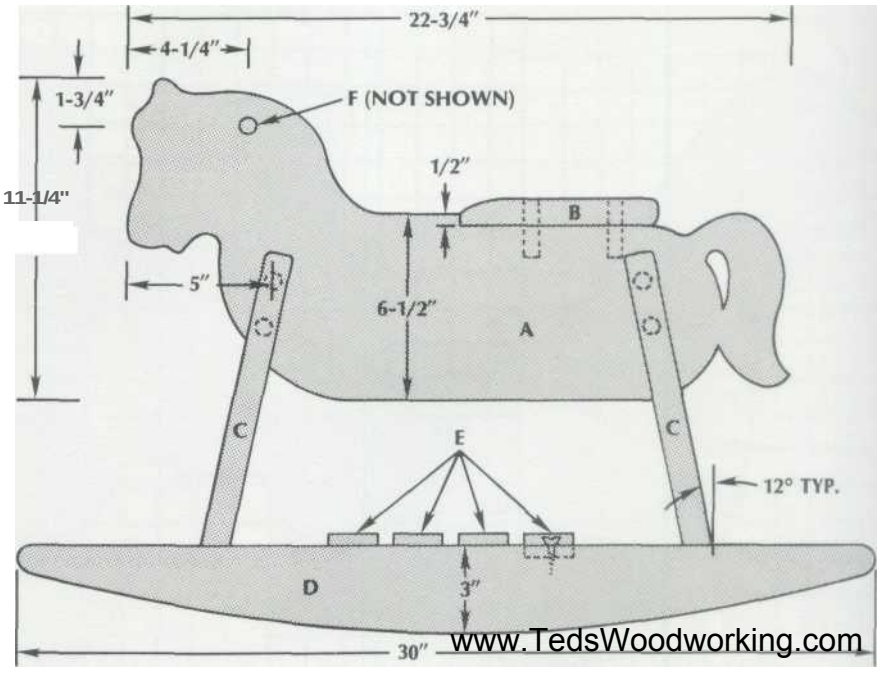
1. Use the pattern provided to make a template for cutting out the horse's body (A). Tape or glue the pattern to a 23" length of 5/4x12 stock, then cut out the profile with a bandsaw or saber saw.

2. Whilethe pattern is still attached to the body, bore a starter hole for the teardrop opening in the tail area, then use a saber saw to completethe cut. Also, mark and drill a 1/2"-diameter hole through the head for inserting the handle (F) and two pairs of holes of the same size in the areas where you want to attach the legs (C). 3. Since exact duplicates are needed for the four legs, it is a good idea to make the leg template out of cardboard. With careful arrangement you should be able to lay out all four legs on an 18" length of 5/4 x 12 stock. Cut out the legs with a bandsaw or saber saw.

NOTE: The edge of the notch at the bottom of each leg must be angled 12° off square so that all four legs will slope in toward the horse's middle. If you prefer, cut out the legs without notches first, then figure out the notches during assembly. The length of the notches is not critical, so long as they are the same on all four legs and the tips of the legs remain above the bottom of the runners after assembly.

4. Lay out the two runners (D) on one side of a 31" length of 5/4 x12 stock. Set them closely together so that enough width remains on the board for cutting out the seat. Use a bandsaw or saber saw to cut out the runners.

5. Lay out the seat (B) on one end of the board from which the runners were taken. Cut out the seat



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with a bandsaw or saber saw, then use a drawknife or other appropriate tool to slope its front so that it ends up only about 9/16" thick at the point where it will join the middle of the horse's back.

6. Rip and crosscut the remainder of the 31"-long board into the four runner spacer slats (E). Then sand all the pieces cut thus far and round over their sharp edges.

7. Begin the assembly by drilling holes in the legs for fastening them to the body. Hold a leg in place and drill through the holes already in the body into that leg. Then remove the leg and repeat the procedure with the leg that fits on the opposite side of the horse.

8. Once all four legs are properly drilled, fasten them to the horse using glue and 1/2"-diameter dowels. Be sure to check the relationship of the dowel length and hole depths before gluing.

9. Once the legs are in place, fit the runners beneath them. Fasten the legs to the runners using glue and #8x1-1/4" flathead wood screws. Counterbore the screws.

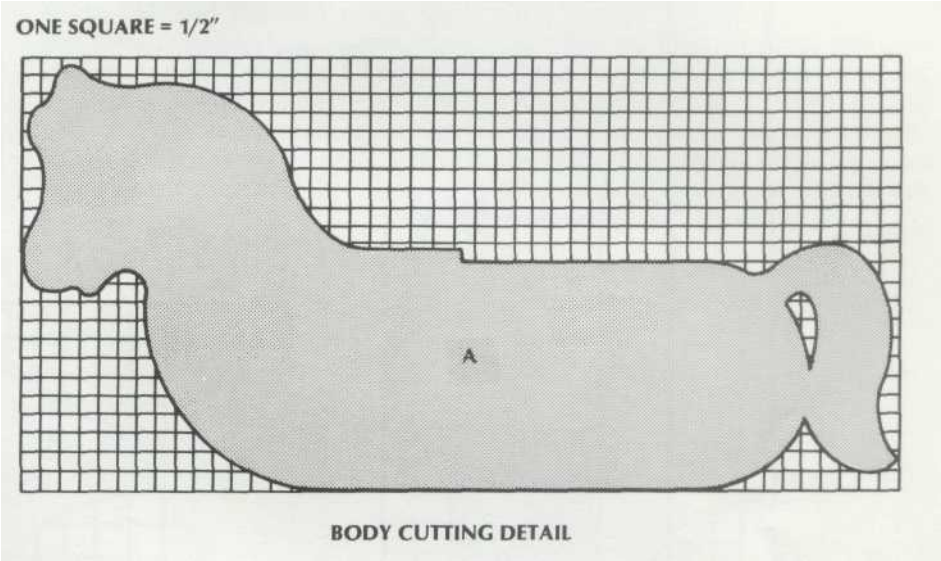
10. Measure the distance between runners, then rabbet the ends of all the runner spacer slats so that they fit snugly into that space. The depth of the rabbets is a matter of taste; just make sure all are cut the same. Center the entire group of slats between the legs and space them about 1/2" apart.

11. Fasten the slats to the runners using glue and #8 x 1-1/4" flathead wood screws. Counterbore the screws slightly below the surface.

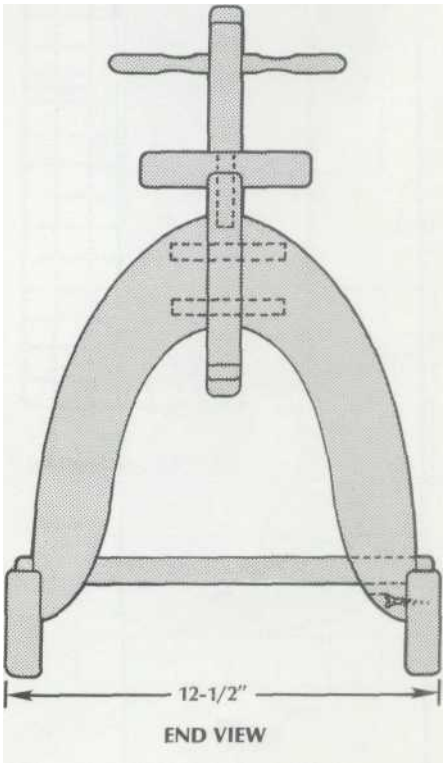
12. Lay out and drill parallel 1/2"-diameter holes in the seat and in the horse's back. Fasten the seat in place using glue and 1/2"-diarneter dowels.

13. Cut a piece of 1/2"-diameter dowel 7" in length and run it through the hole in the horse's head. Center the dowel, then secure it in place by driving a screw down through the head into the dowel. Use a wood rasp and sandpaper to shape the dowel into a form comfortable for small hands.

14. If you wish, fill the counterbored screw holes with wood plugs or putty. Give the horse a final touchup sanding and apply the nontoxic finish of your choice.



BODY CUTTING DETAIL

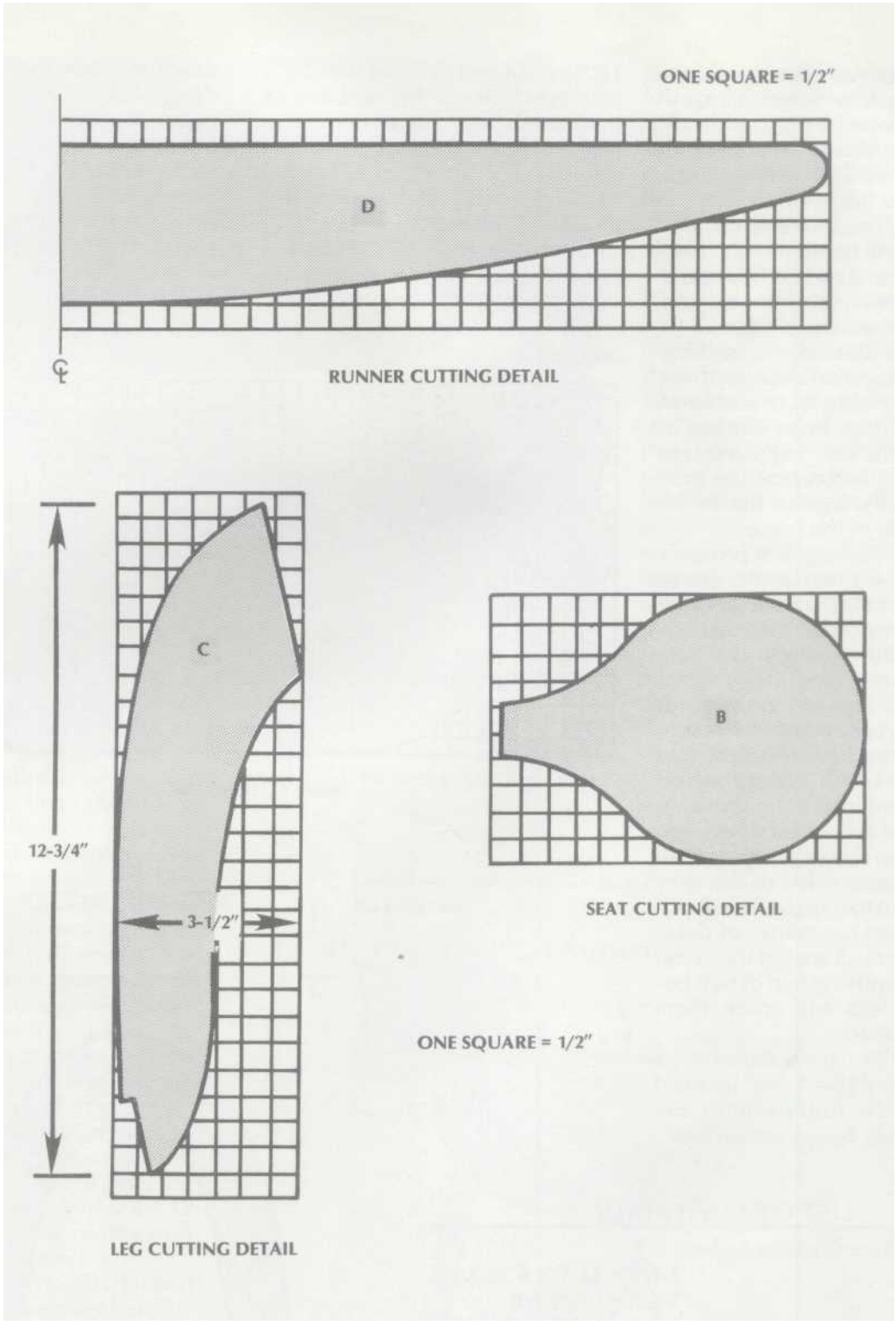


END VIEW

LIST OF MATERIALS

(finished dimensions in inches)

A	Body	1-1/8 × 11-1/4 × 22-3/4
B	Seat	1-1/8 × 5 × 6-7/8
C	Legs (4)	1-1/8 × 3-1/2 × 12-3/4
D	Runners (2)	1-1/8 × 3 × 30
E	Spacer slats (4)	1-1/8 × 1-3/4 × 12
F	Handle	1/2 dia. × 7
	Dowels (4)	1/2 dia. × 5
	Flathead wood screws	#8 × 1-1/4
	Wood glue	



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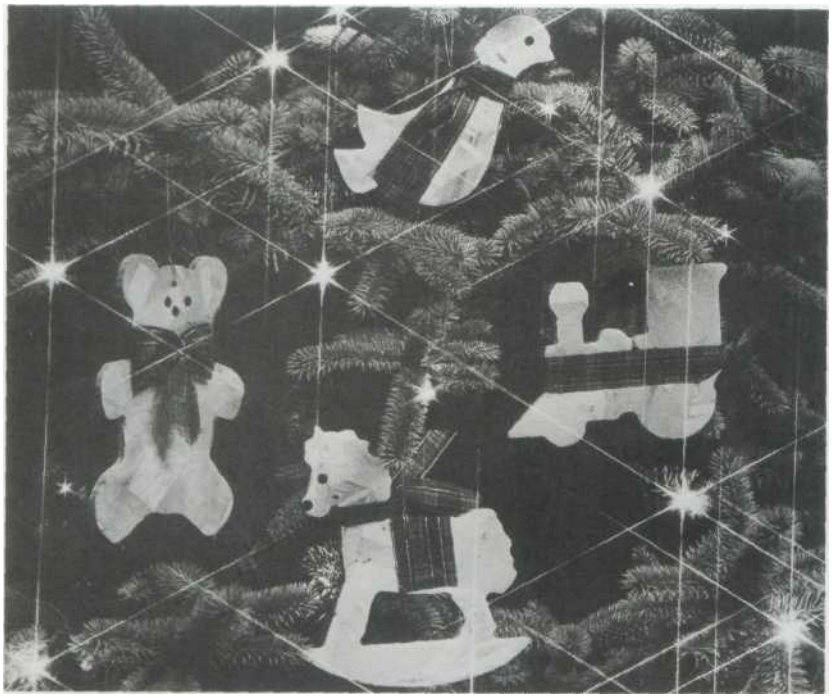
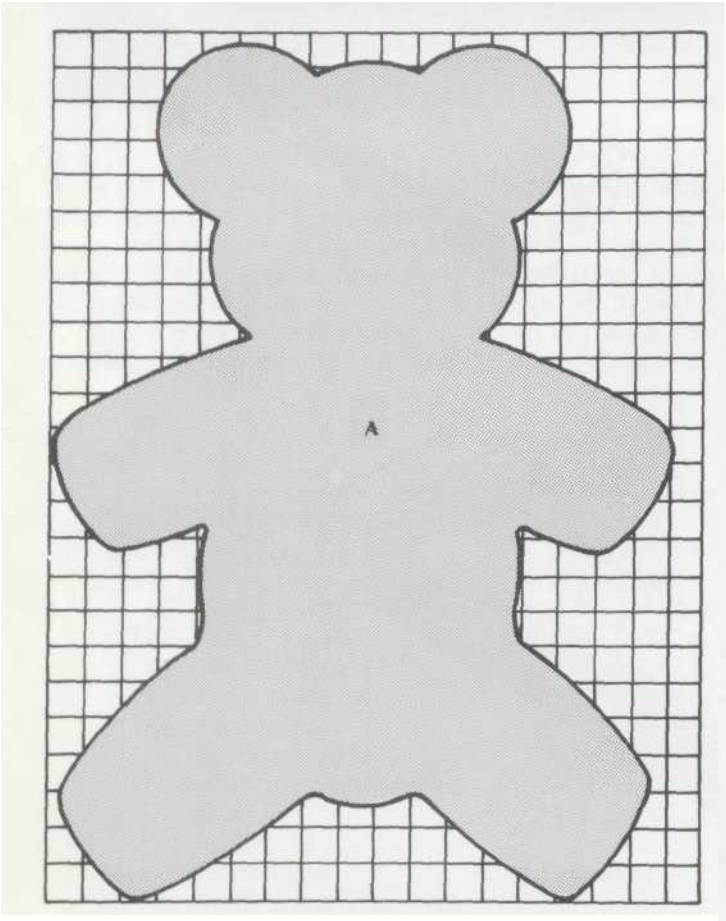
CHRISTMAS ORNAMENTS



Nothing adds to the beauty and wonder of the family Christmas tree quite like homemade ornaments. These eye-catching figurines can be made easily from 1/2" wood on a bandsaw or jigsaw. Your children are sure to want them all: the bear (A), dove (B), hobbyhorse (C), and train (D).

1. Make a template of the figu rines using the patterns provided.
2. Cut out the shapes on a band saw or jigsaw, then use a disc sand er or belt sander to sand all of the outside surfaces.
3. Finish the figurines as desired, or leave them unfinished for a more rustic look. Add ribbon as shown for a final touch.

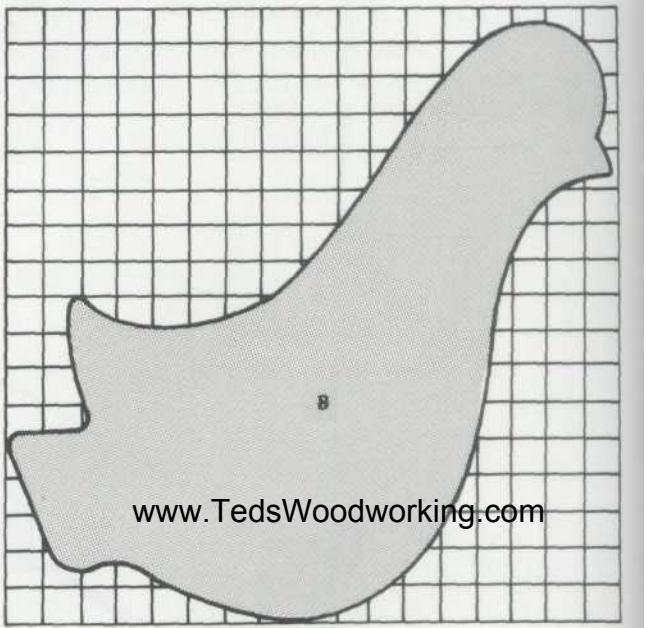


LIST OF MATERIALS

(finished dimensions in inches)

A	Bear	1/2 × 3-1/4 × 4-1/2
B	Dove	1/2 × 3-1/8 × 3-1/8

ONE SQUARE = 3/16"



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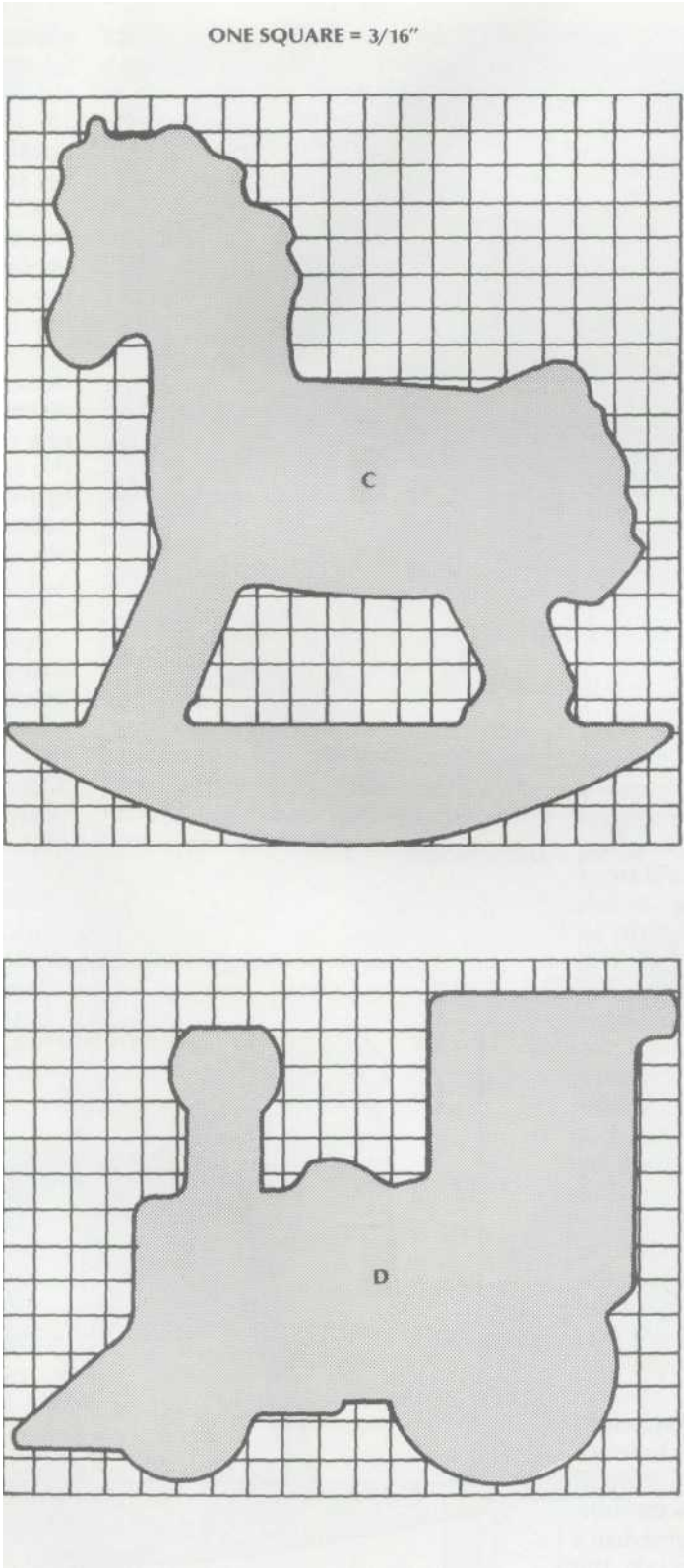

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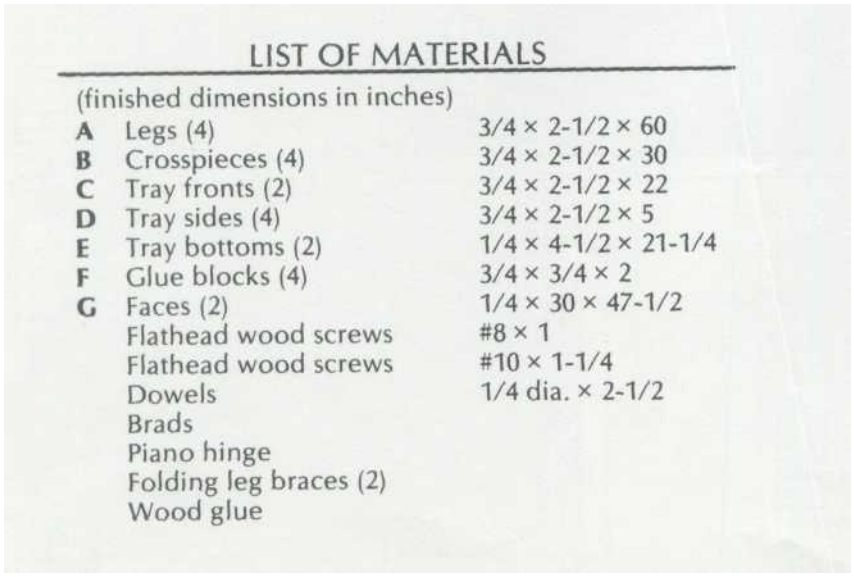
CHILD'S EASEL

Here's a project guaranteed to provide hours of fun for your children: a lightweight, collapsible easel with a dent-free surface made from 1/4" hardboard. 1. Cut all of the pieces to size according to the dimensions provided. Cut a dado 3/8" deep and 2-1/2" wide approximately 12-1/2" from the bottom of each leg (A). 2. Rabbet the ends of the crosspieces (B) and the tops of the legs to the same dimensions as the dado cuts made in the previous step.

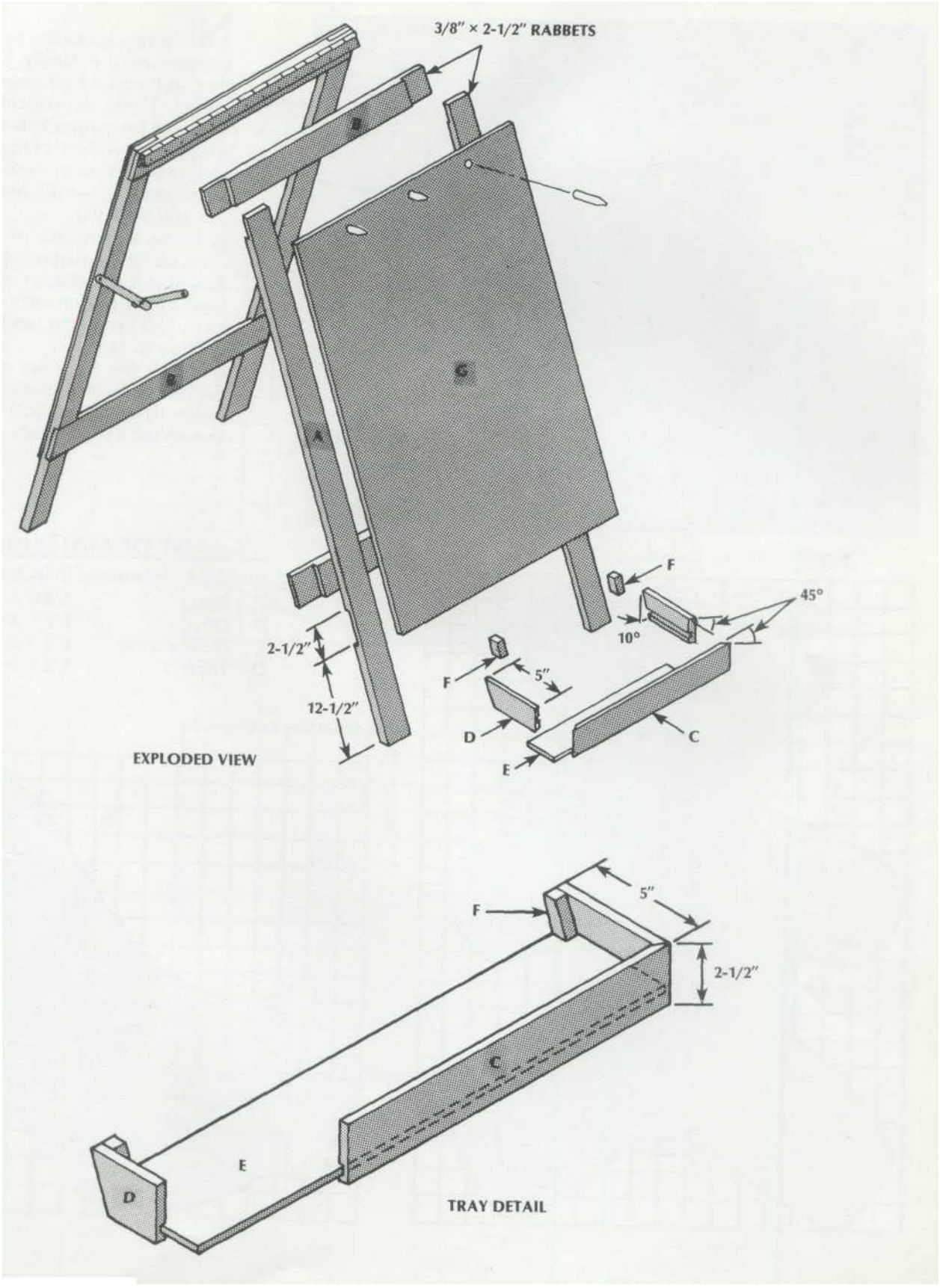


LIST OF MATERIALS

(finished dimensions in inches)

A	Legs (4)	3/4 × 2-1/2 × 60
B	Crosspieces (4)	3/4 × 2-1/2 × 30
C	Tray fronts (2)	3/4 × 2-1/2 × 22
D	Tray sides (4)	3/4 × 2-1/2 × 5
E	Tray bottoms (2)	1/4 × 4-1/2 × 21-1/4
F	Glue blocks (4)	3/4 × 3/4 × 2
G	Faces (2)	1/4 × 30 × 47-1/2
	Flathead wood screws	#8 × 1
	Flathead wood screws	#10 × 1-1/4
	Dowels	1/4 dia. × 2-1/2
	Brads	
	Piano hinge	
	Folding leg braces (2)	
	Wood glue	

3. Glue and clamp the legs and crosspieces together.
4. Cut one end of each tray side (D) at a 10° angle; the other end is mitered 45° as shown. The tray fronts (C) are mitered 45° on each end.
5. Cut a groove 3/8" deep and 1/4" wide 3/8" above the bottom of the tray fronts and sides.
6. With the tray bottoms (E) in place, construct the trays using glue and 1-1/4" brads. Attach two glue blocks (F) to each tray with a slight setback to hold the trays snug when screwed to the frame.
7. Connect the two easel frames with a piano hinge and folding leg braces. Position the braces to allow the easel to open wide enough to prevent it from tipping over.
8. Fasten the faces (G) to the easel frames using glue and #8 flathead wood screws, making their top edges flush. Drill three evenly spaced 1/4"-diameter holes through each face and into the top crosspiece on each side. In each hole, glue a 1/4"-diameter dowel that has been tapered to a dull point.
9. Fasten the trays to the easel faces using glue and #10 flathead wood screws. Center the trays across the width of the faces and make their lower edges flush.
10. To complete the easel, fill all screw holes with putty, and finish as desired.



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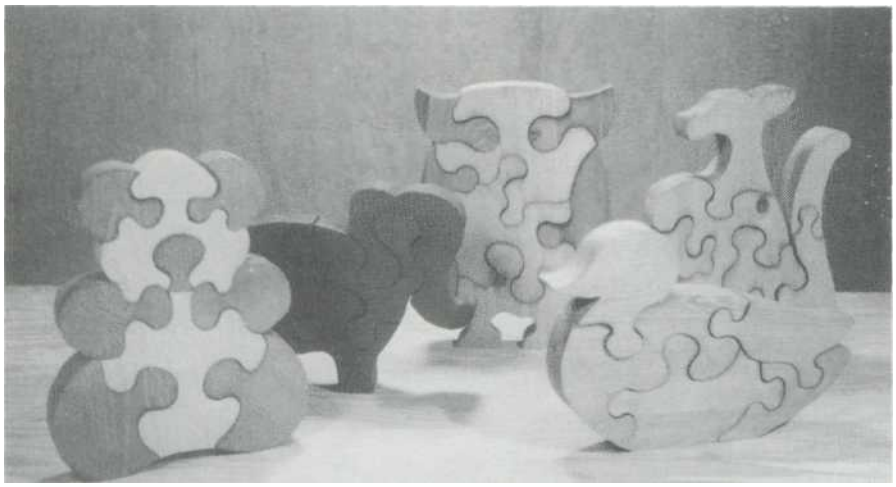
PUZZLES



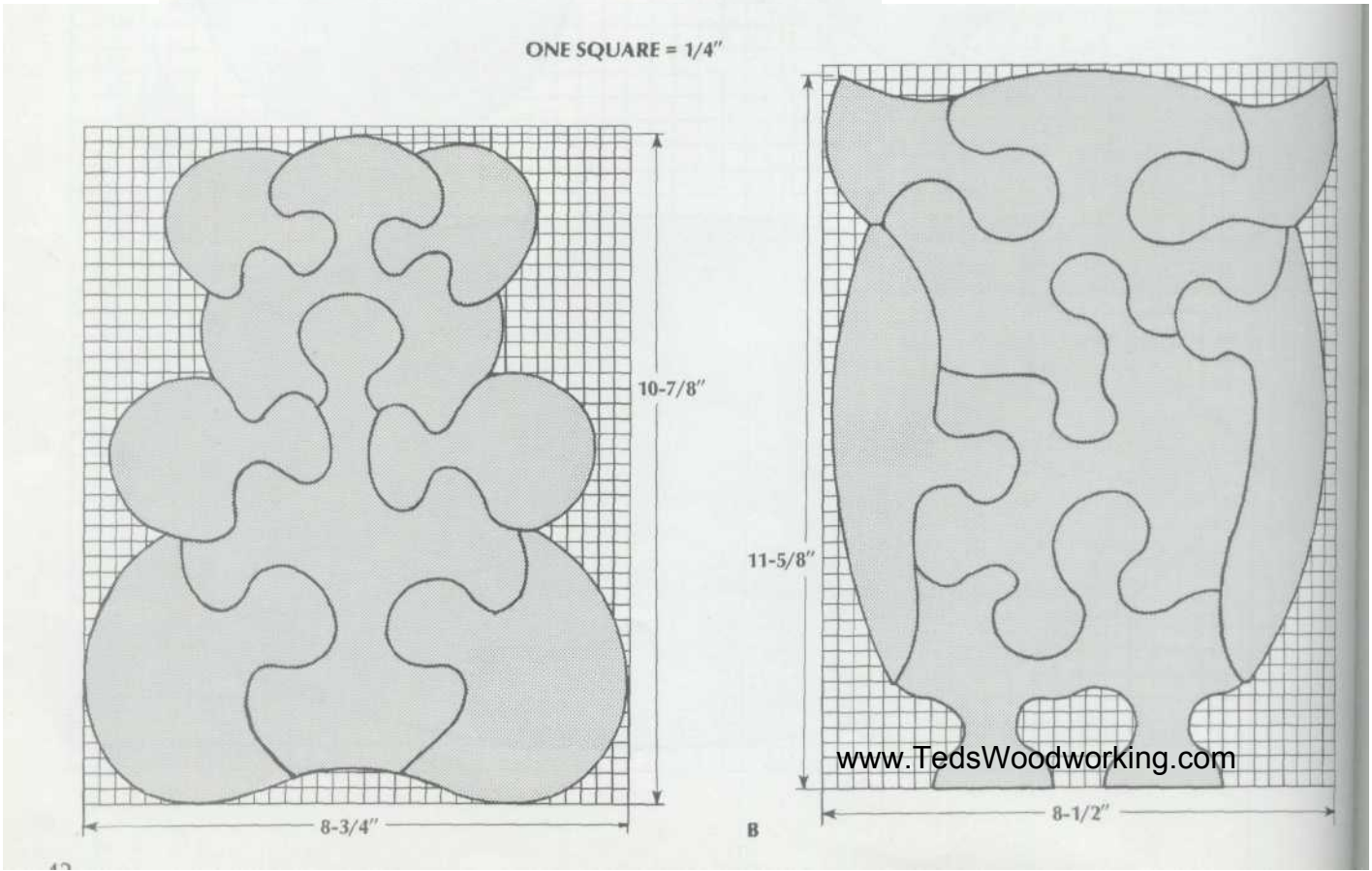
Puzzles have always fascinated children and adults alike. Here are five fun animal puzzles you can make on a bandsaw or jigsaw: a bear (A), owl (B), duck (C), elephant (D), and kangaroo (E).

1. Make two templates of each puzzle design—one template for the outside shape and one for the inside individual pieces. Use 1-1/2"-thick stock or two pieces of 3/4" stock face-laminated together,cutting the pieces 1/4" wider and 1/4" longer than the dimensions called for.
2. Trace the ouside and inside patterns on the workpieces. On a bandsaw or jigsaw, cut the outside shape first, then cut the individual pieces apart.
3. Using a disc sander or belt sander, sand all of the outside surfaces of the puzzle pieces.
4. If desired, use a nontoxic stain, such as food coloring, to highlight certain parts of the puzzles or to create contrasts between parts.

LIST OF MATERIALS

(finished dimensions in inches)

A	Bear	1-1/2 × 8-3/4 × 10-7/8
B	Owl	1-1/2 × 8-1/2 × 11-5/8
C	Duck	1-1/2 × 11-5/8 × 8-3/8
D	Elephant	1-1/2 × 12 × 8-3/8
E	Kangaroo	1-1/2 × 8-1/2 × 11-5/8



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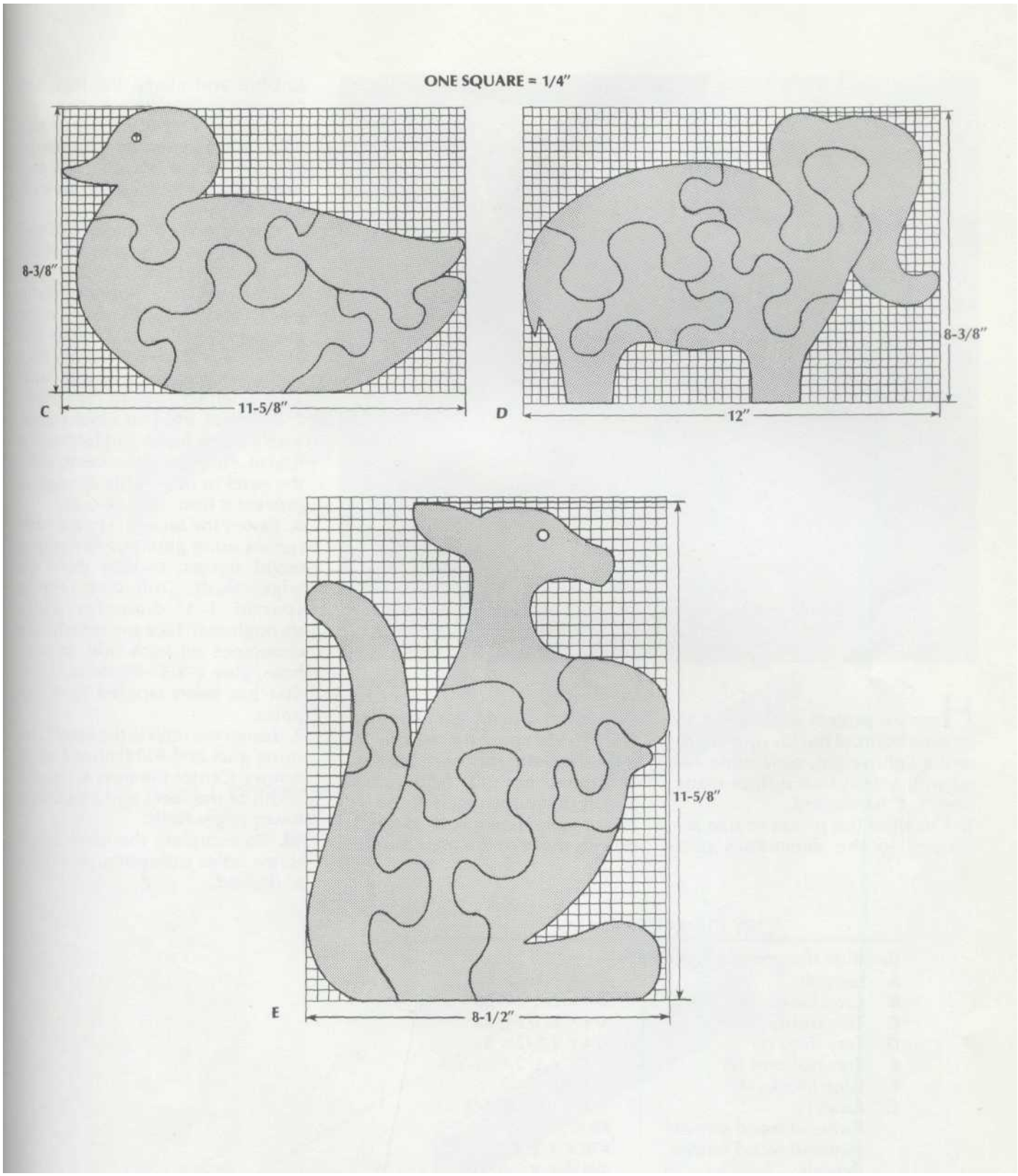
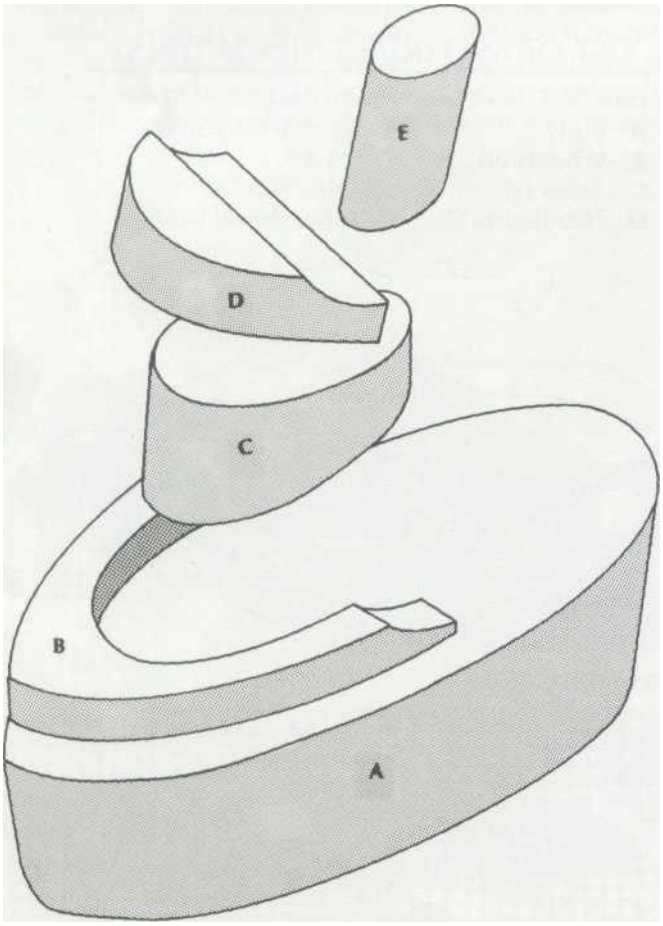
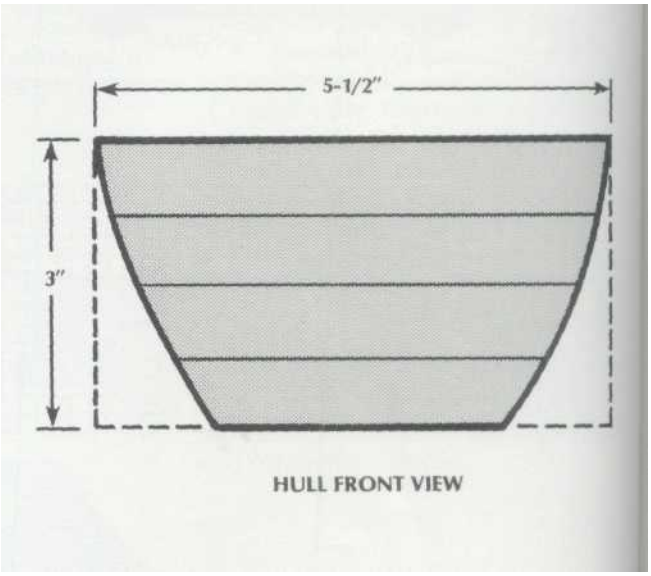

ONE SQUARE = 1/4"
8-3/8"
C
11-5/8"
D
8-3/8"
12"
11-5/8"
E
8-1/2"

TUG BOAT

This sturdy tugboat floats on water, so a child can enjoy it in the bathtub or swimming pool. The all-wood design makes it safe to play with, and it can be built in no time at all. Be sure to use waterproof glue when assembling.

1. Cut blanks for the thicker pieces from 3/4" stock face-laminated with water-resistant glue. Cut all pieces to the listed dimensions.
2. Cut out the shapes on a band saw using the patterns provided. When cutting the hull (A), set the bandsaw table at a 10° tilt; this will reduce the sanding needed to shape the contour.
3. Turn the smokestack (E) round on a lathe, then remove stock by sanding or rasping from both sides of the cylinder to make it oval-shaped. Angle the top of the smokestack and the deck house (C)at10°.
4. Use a belt sander with a sanding drum to make the inside concave curves on the railing (B) and pilot house (D). Shape the hull with a convex curve as the sides taper in toward the keel, gradually at first and then sharply toward the bottom.
5. Rough sand all the pieces with coarse sandpaper, then repeat with gradually finer grits. If using a belt sander, always keep the workpiece moving to eliminate any large flat spots in the contour.
6. Before final assembly, test the tugboat to make sure it floats even ly. Attach the railing to the hull and carefully set them in the water. Move the pilot house, deck house, and smokestack into a position that enables the tugboat to float up right and level.
7. Mark the exact position of the parts, then assemble using water proof glue and clamps. Dowelscan also be used for added strength.
8. Finish as desired.





LIST OF MATERIALS

(finished dimensions in inches)

A	Hull	3 × 5-1/2 × 12
B	Railing	3/4 × 5-1/2 × 7
C	Deck house	2-1/4 × 3 × 5
D	Pilot house	1-1/2 × 4 × 3-1/4
E	Smokestack	1-1/2 × 1-1/2 × 4
	Water-resistant wood glue	

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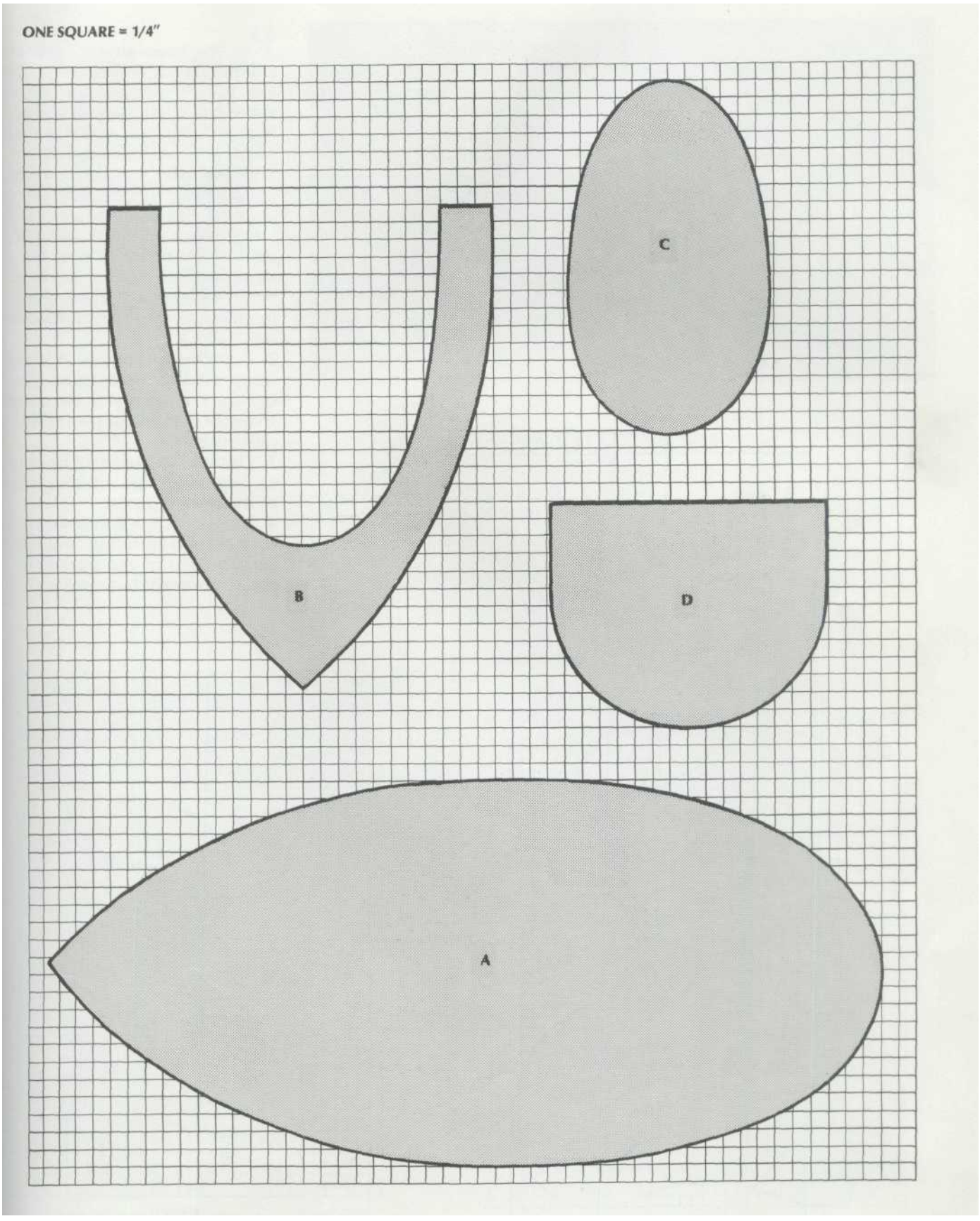

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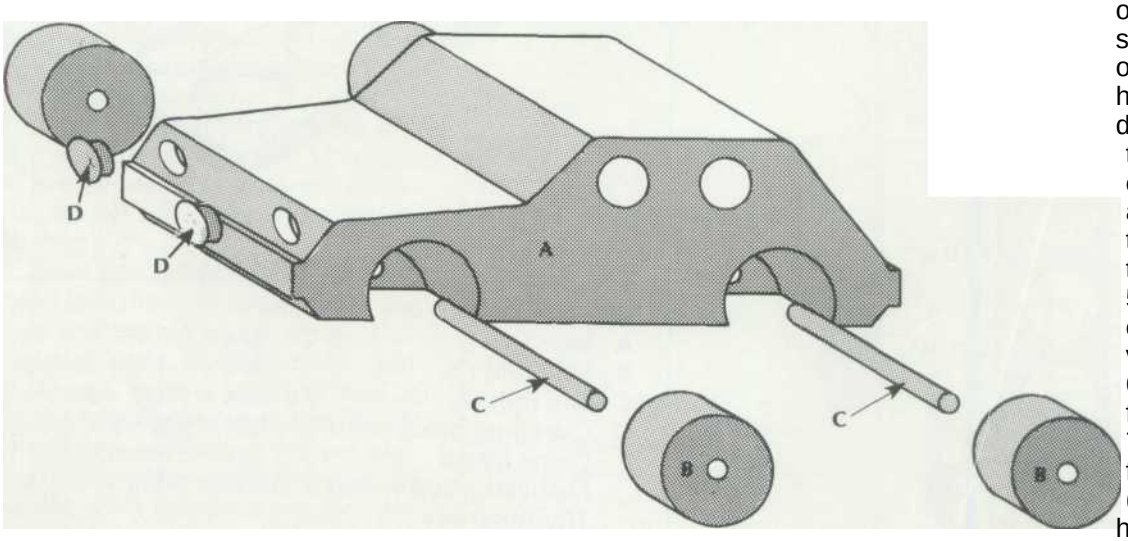
TOY CARS

Remember how those toy cars you played with as a child never wore out? Now you can make those sturdy, all-wood toys again by following these simple plans. While specific features vary, each of these toy cars is made in the same fashion. Naturally, you might want to experiment with the designs to suit your own tastes.



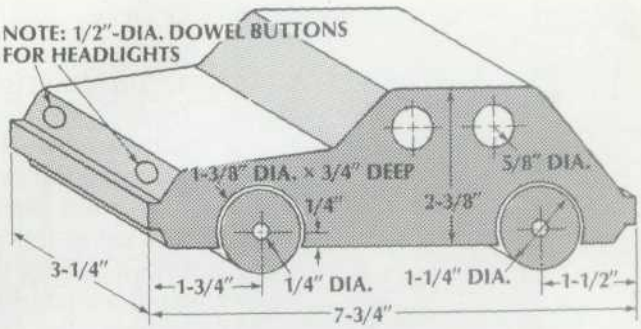
1. Make a cardboard template of the car design. Trace the pattern on a 4 x 4.
2. Cut the desired car body shape (A) with a bandsaw.
3. Drill the various holes for the windows, wheel wells, headlights, and axles. Use a Forstner bit to cut the wheel wells.
4. Using a hole saw, cut four wheels (B) to the dimensions given out of 3/4" scrap stock. The hole saw will simultaneously cut the outside contour and mark the axle hole of the wheel. Drill the 1/4"-diameter axle holes. As an alterna tive, the wheels can also be turned on your lathe. Drill a 1/4"-diameter axle hole through the middle of the block before turning, then turn the cylinder and cut it into wheels.
5. Before assembling the car, power sand and file each of the individual pieces.
6. Finish sand the pieces with a fine sandpaper (100 grit or finer).
7. To assemble the car, rub paraf fin on the middle part of the axles (C) and slide them through the holes in the car body. Glue the wheels to the axle ends. Finally, glue the 1/2"-diameter dowel buttons into the headlight holes.
8. Check to make sure that the wheels and headlights cannot be removed by a child, then give the car a nontoxic finish.

In the future use these guidelines and your imagination to design vans, buses, taxis, fire engines, and other toy vehicles.

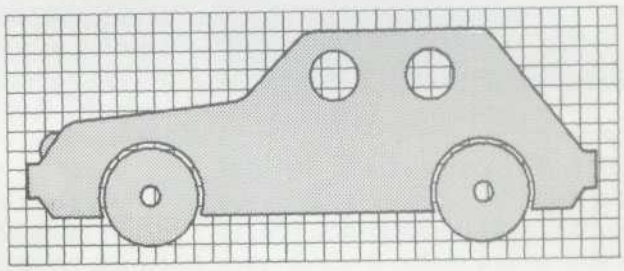
LIST OF MATERIALS (Sedan)

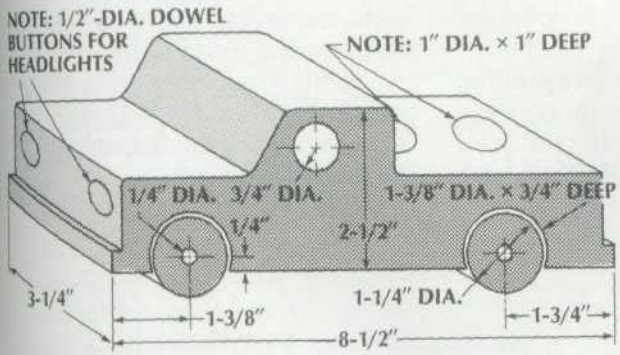
(finished dimensions in inches)

A	Body	2-3/8 × 3-1/4 × 7-3/4
B	Wheels (4)	1/4 dia. × 3/4
C	Axles (2)	1/4 dia. × 3-1/4
D	Headlights (2)	1/2-dia. dowel buttons



ONE SQUARE = 1/4"





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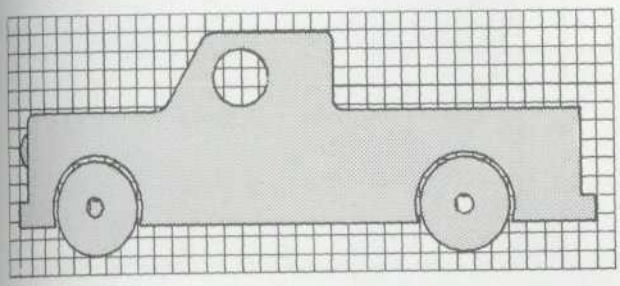
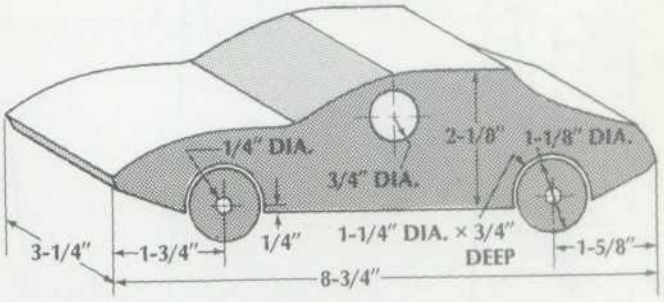


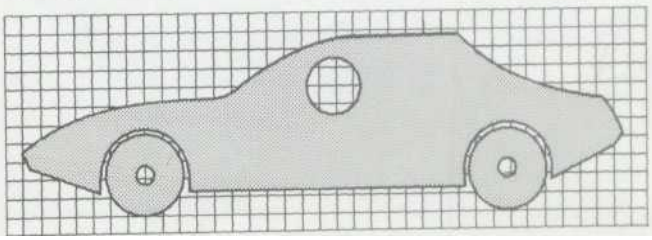
LIST OF MATERIALS (Pickup Truck)

(finished dimensions in inches)

A	Body	2-1/2 × 3-1/4 × 8-1/2
B	Wheels (4)	1-1/4 dia. × 3/4
C	Axles (2)	1/4 dia. × 3-1/4
D	Headlights (2)	1/2-dia. dowel buttons



ONE SQUARE = 1/4"



LIST OF MATERIALS (Sports Car)

(finished dimensions in inches)

A	Body	2-1/8 × 3-1/4 × 8-3/4
B	Wheels (4)	1-1/8 dia. × 3/4
C	Axles (2)	1/4 dia. × 3-1/4

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COFFEE TABLE

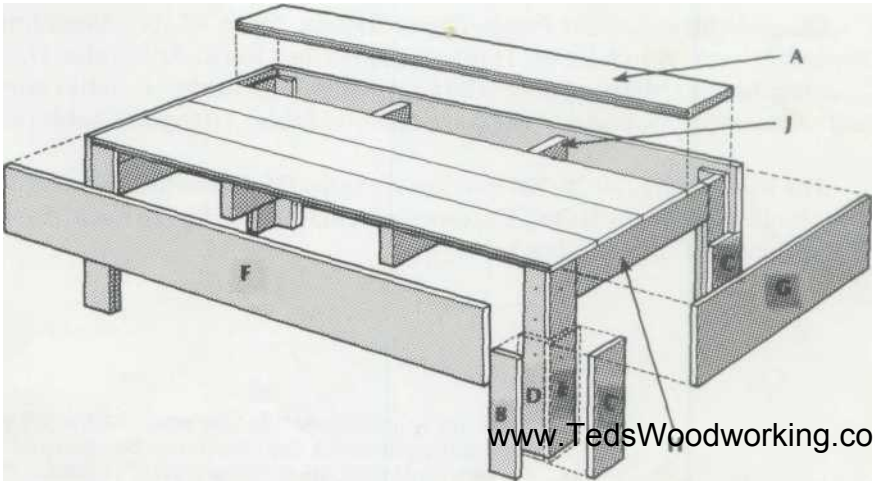
This coffee table can be built from clear grade redwood and features a tongue-and-groove board top. Feel free to use another variety of wood, either stained or left natural color.

1. Cut all of the pieces to size using the dimensions given.
2. Construct the inner legs (D, E) then connect them in two pairs by fastening a top support (H) to the backs of the wide inner leg pieces. The upper edge of the top supports should be flush with the top of the inner legs.
3. Fasten the outer legs (B, C) to the inner legs. To achieve a good corner joint, place a square block inside the inner legs and use band clamps to hold the assembly while it dries.
4. Set the side frame pieces (F) on the outer legs, their ends flush with the corner on the outer legs. Glue and nail in place, then fasten the end frame pieces (G) in position.
5. Rip one top piece (A) down the middle. Set the tongue section on the table and push its ripped edge against the side frame. Then fit the other three uncut pieces in place. Trim the ripped edge of the remaining piece as needed to fit it in and complete the top.
6. Make sure the outer pieces of the top are flush with the top of the side frames, then drive a few finishing nails through the frames into those top pieces. Also, drive nails through the ends of the top pieces into the top supports.
7. Turn the table over on its top. Fit the two cross braces (J) in place, then drive a couple of finishing nails through the side frames into the ends of each brace. Install glue blocks or metal corner bracing between the cross braces and the side frames.
8. Turn the table right side up and drive a pair of finishing nails through each full top piece, then drive one through each narrow piece into the brace.
9. Set all nails, fill the holes with putty, sand, and finish the table as desired.

LIST OF MATERIALS

(finished dimensions in inches)

A	Top pieces (4)	3/4 × 5-1/2 × 52-1/2 (tongue and groove)
B	Outer leg pieces (4)	3/4 × 3-1/2 × 12-1/2
C	Outer leg pieces (4)	3/4 × 2-1/2 × 12-1/2
D	Inner leg pieces (4)	3/4 × 2-1/2 × 17-1/4
E	Inner leg pieces (4)	3/4 × 1-1/2 × 17-1/4
F	Side frame pieces (2)	3/4 × 5-1/2 × 54
G	End frame pieces (2)	3/4 × 5-1/2 × 20-3/4
H	Top supports (2)	3/4 × 3-1/2 × 19-1/4
J	Cross braces (2)	1-1/2 × 3-1/2 × 20-3/4
	Wood screws	#8 × 1-1/4
	4d finishing nails	
	Glue blocks or metal corner bracing	
	Wood glue	



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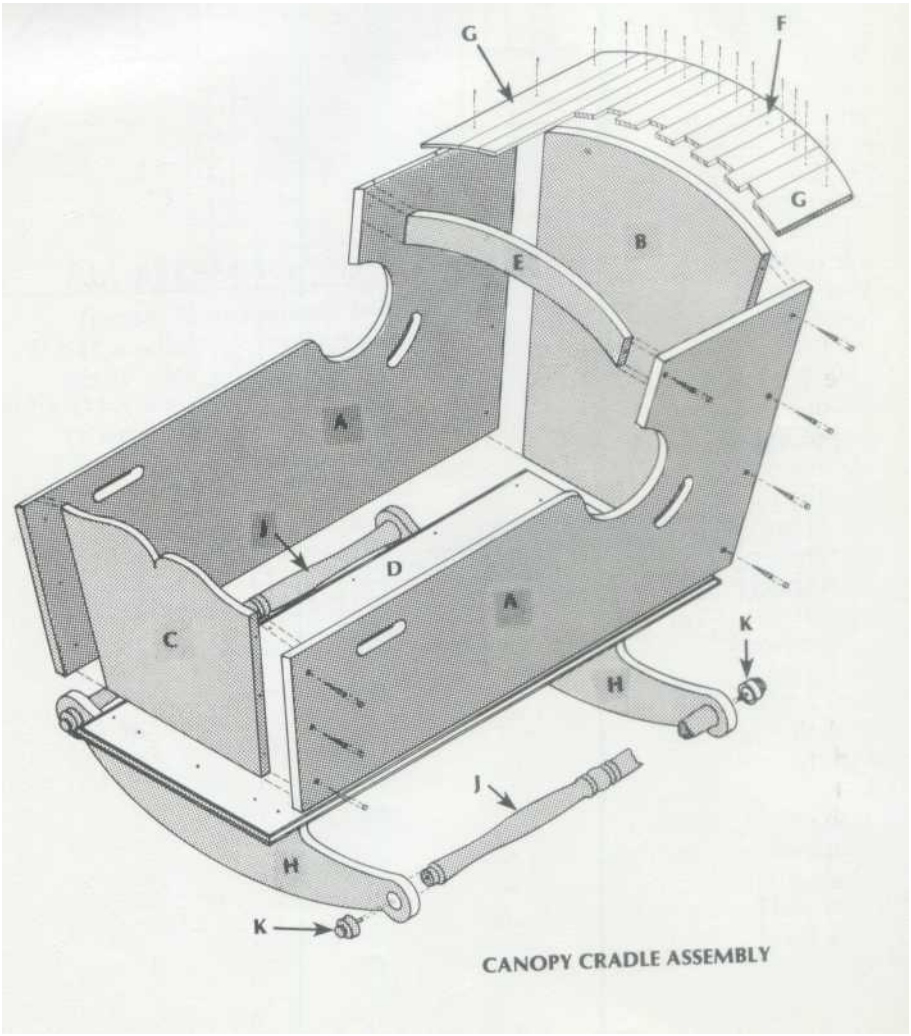
CHILDS CRADLE



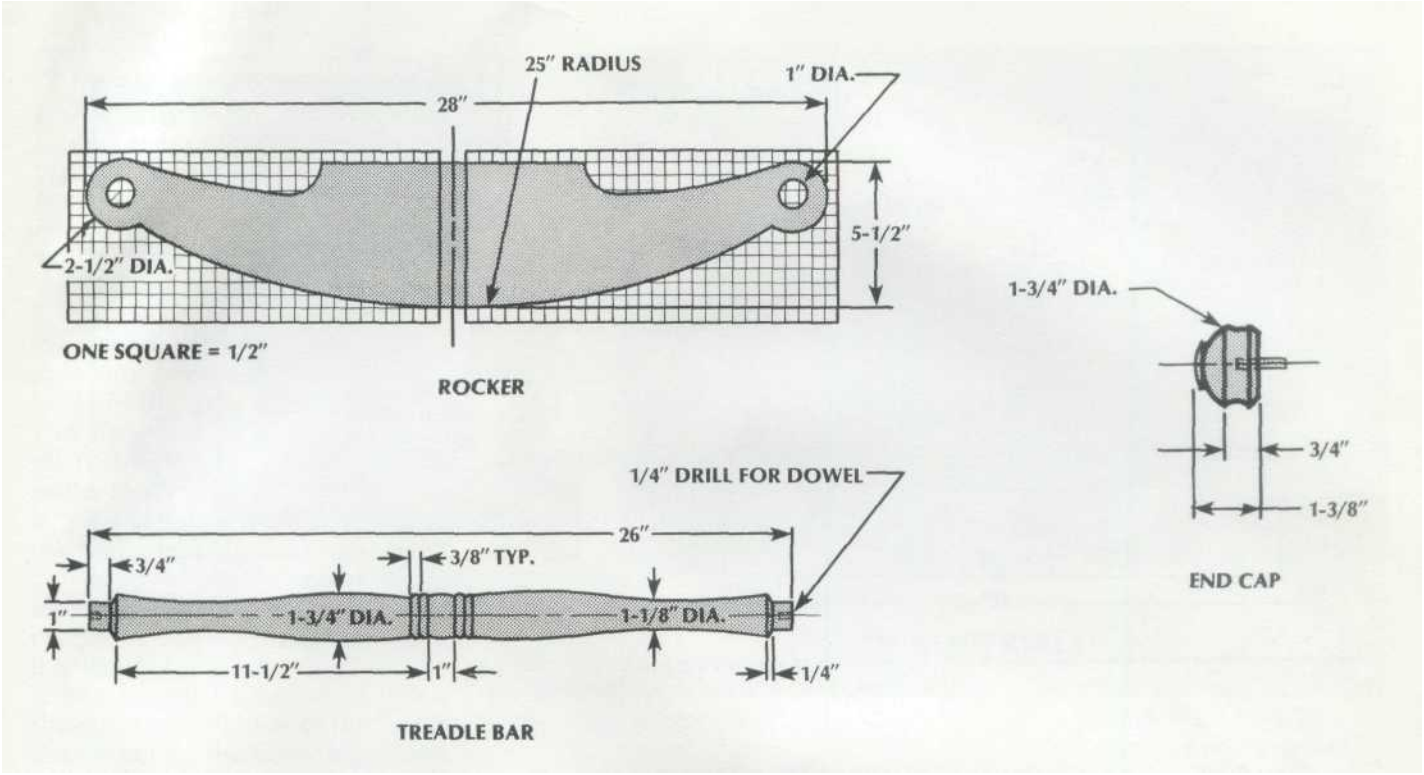
CANOPY CRADLE ASSEMBLY

You'll love this old-fashioned cradle as much as your ancestors did. The lightly arched canopy protects a baby's sensitive eyes from harsh light. The convenient treadle bars allow you to rock the cradle with one foot while reading or knitting. In short, it's the perfect way to rock your child to sleep.

1. Use the patterns provided to cut the shapes of the sides (A), headboard (B), and footboard (C) to the dimensions provided. Cut the angle ends and bevel edges as shown.
2. Cut the handles in the sides, and shape the top edge of each piece as shown.
3. Shape the edge of the base (D) to the profile of your choice; the pattern shown is a radius bead. To minimize splintering, shape the ends of the base first, then do the sides.
4. Sand all of the pieces smooth. A drum sander will be necessary to sand the curve in the sides and the pattern cut in the footboard.
5. Assemble the sides to the headboard and footboard with glue and counterbored #8 x 1-1/2" flathead wood screws. Transfer the pattern to the canopy support (E) stock.

Hold it up to the assembled sides to mark the angles on the ends. Span the canopy support between the sides and secure it in place with glue and screws.

6. Attach the base to the bottom edge of the sides, headboard, and footboard with glue and counter bored screws from underneath.
7. Cut the canopy pieces (F, G) to size. While cutting to width, rip a 2° bevel on both edges of the center pieces and on the inner edge of each edge piece so the pieces form an arc as shown.
8. Starting in the center and working toward the ends, attach the canopy pieces with brads. When finished, sand the top for a smooth, rounded contour.
9. Cut two pieces of stock to 1-3/4"



bar (J) and two end caps (K) from each piece. Cut off the end caps and trim each piece to finished length.

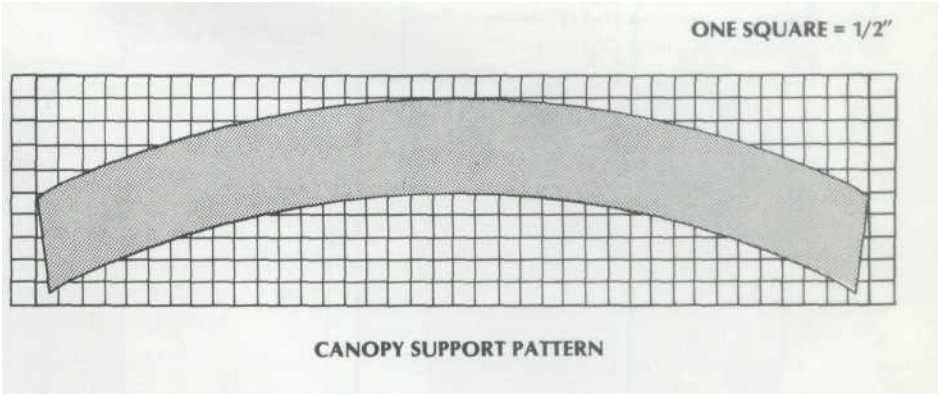
10. Cut two pieces of stock to the listed dimensions for the rockers (H), then shape the pieces according to the pattern provided. Drill 1"-diameter holes in the rockers for the treadle bars.

11. Drill a 1/4"-diameter dowel hole 1/2" deep in each end of the treadle bars and in the adjoining end of each end cap.

12. Insert the ends of the treadle bars through the holes in the rock ers. Attach the end caps with 1/4"-diameter x 1" dowels and glue. Then attach the rockers to the bot tom of the base with glue and counterbored wood screws.

13. Cover all counterbored screws with 3/8"-diameter dowel plugs. Sand the plugs flush, then finish sand the cradle.

14. Finish as desired; a nontoxic finish is best. Make sure the finish is applied well in advance of the baby's arrival in order for the finish to dry and lose its odor. A polyurethane finish is best.



LIST OF MATERIALS

(finished dimensions in inches)

A	Sides (2)	3/4 × 21-1/2 × 40
B	Headboard	3/4 × 23-1/4 × 19
C	Footboard	3/4 × 13-1/2 × 15-1/4
D	Base	3/4 × 15-1/2 × 36
E	Canopy support	3/4 × 4 × 19
F	Canopy center pieces (12)	1/4 × 1-1/4 × 14
G	Canopy edge pieces (2)	1/4 × 3 × 14
H	Rockers (2)	3/4 × 5-1/2 × 28
J	Treadle bars (2)	1-3/4 dia. × 26 dowels
K	End caps (4)	1-3/4 dia. × 1-3/8
	Dowels	1/4 dia. × 1
	Dowel plugs	3/8 dia. × 1/4
	Flathead wood screws	#8 × 1-1/2
	Brads	#18 × 1
	Wood glue	

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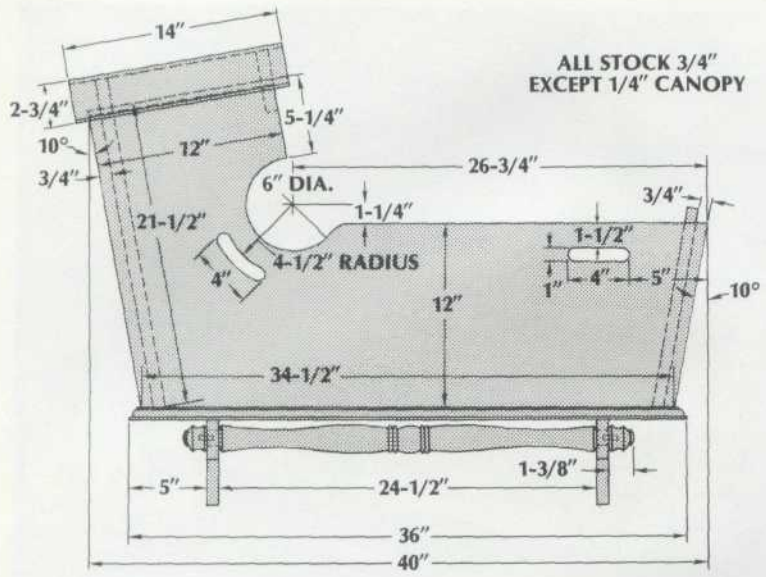
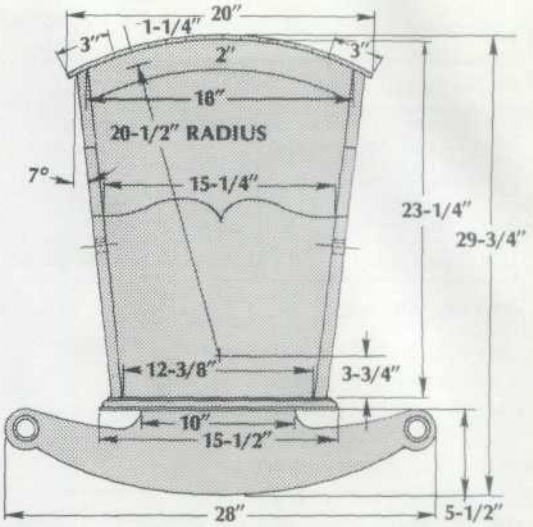
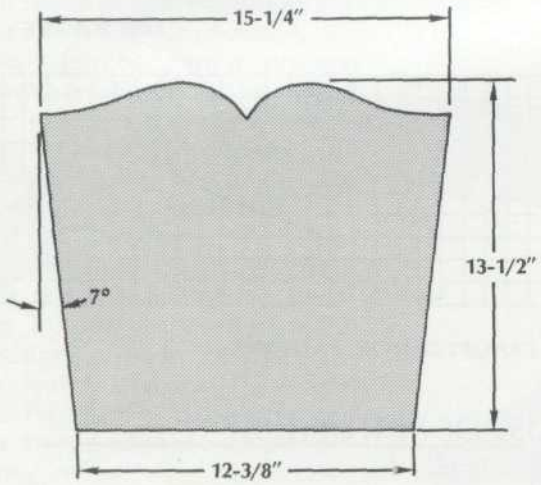
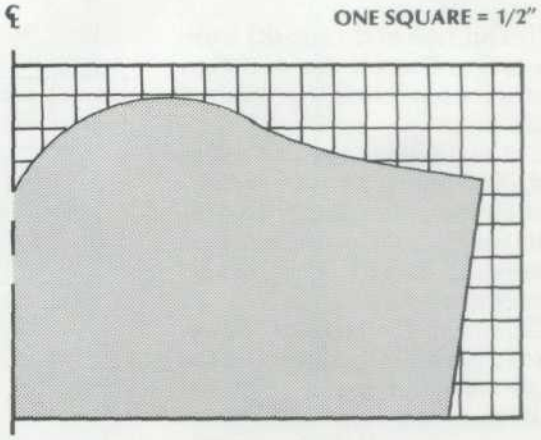




CANOPY CRADLE



FOOTBOARD



TOP OF FOOTBOARD PATTERN

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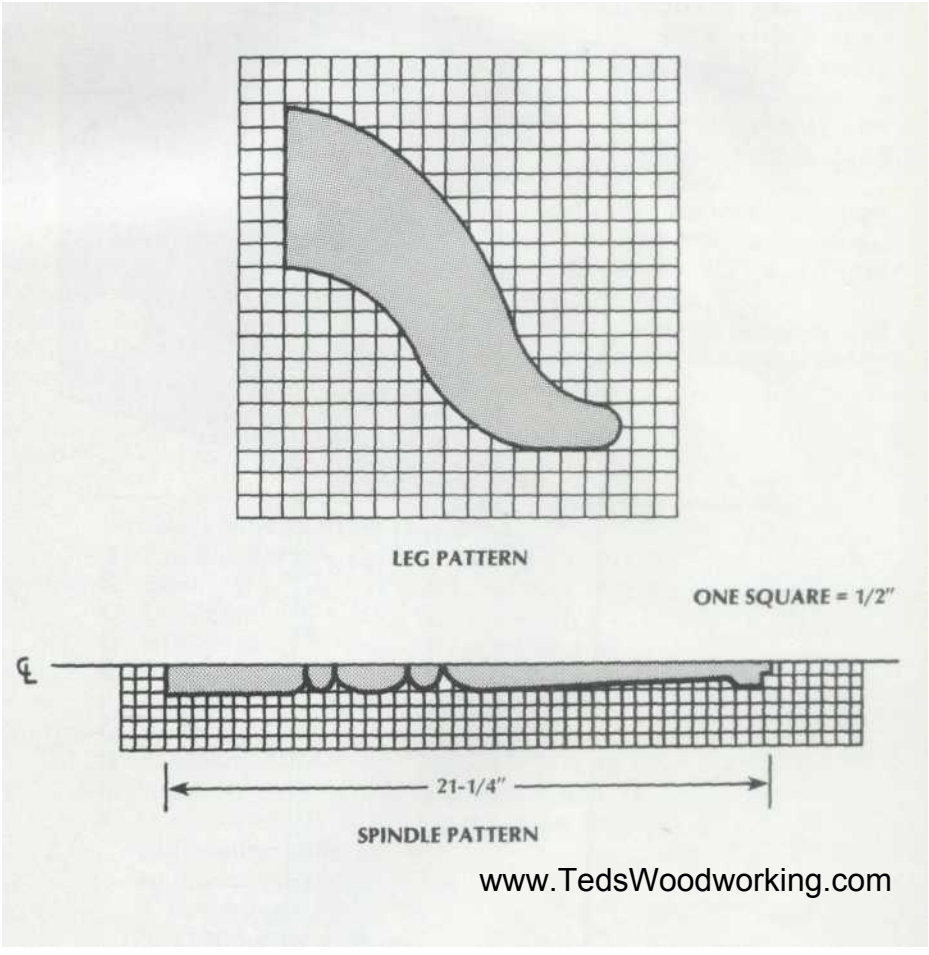
CONCORD TABLE

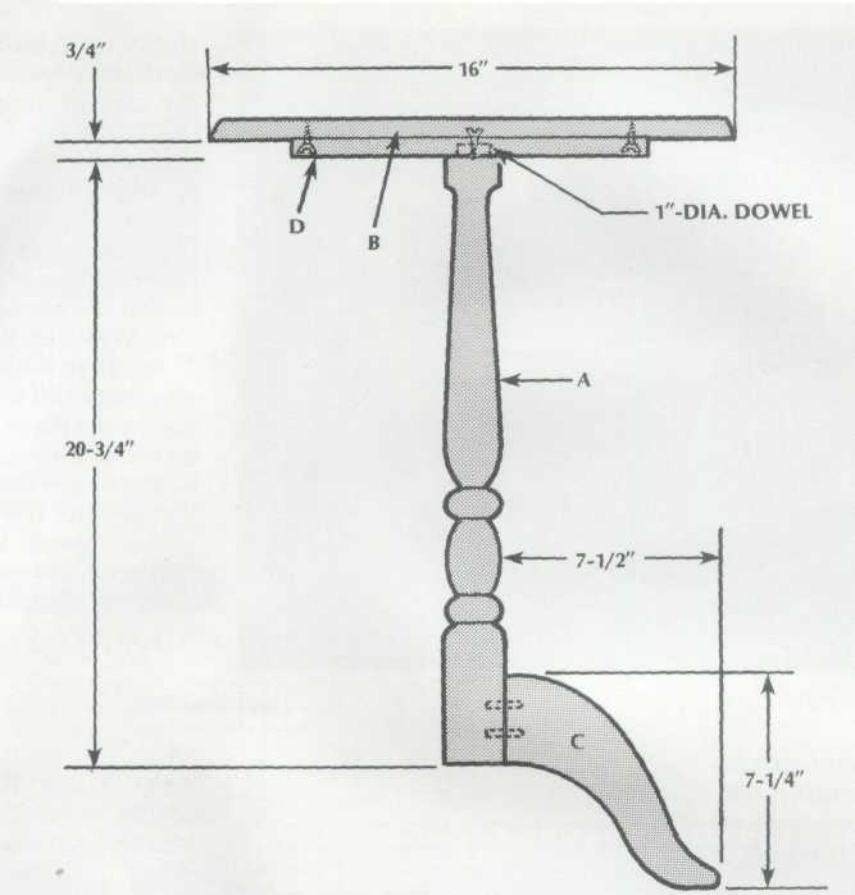
Also known as a candle stand ta-ble, this traditional favorite can be made quickly using a lathe. It lends itself to being a gift item as well.

1. Cut the stock to size according to the dimensions provided.
2. To make the template for the spindle (A), lay out the pattern on a piece of 1/4"-thick stock. Use a scroll saw, bandsaw, or jigsaw to cut out the pattern, and sand the edges smooth.
3. Mount the spindle stock on the lathe, turn the spindle, then sand. (If you glue up stock, it must be clamped for at least 24 hours be fore turning.)
4. Make a template for the legs (C) in the same manner, cut out the legs, and sand the curves on a drum sander.

Drill 3/8"-diameter holes to ac commodate the dowels in the legs as shown.

6. Use a router with a 1/4" round ing over bit to shape the curved edges of the legs. Do not shape the straight sections.
7. On the drum sander, sand a concave curve in the straight por tion of the legs. This will provide a better fit when attaching the legs to the spindle.
8. Mark and drill two 3/8"-diame- ter holes in the spindle base as shown to accommodate the dow els. Glue the legs to the spindle, one at a time, and allow each leg time to set up. Make sure the bot toms of the legs are square to the outside of the spindle.
9. Glue and clamp the stock for the top (B). When the glue has dried, lay out the 16"-diameter cir cle and cut it out using a scroll saw, bandsaw, or jigsaw.
10. Disc sand the edges of the top. The top edge can be shaped with a router and a roman ogee bit.
11. Drill a 1"-diameter hole in the center of the top brace (D) to ac commodate the dowel.
12. Screw the top brace to the spindle, then screw the top to the top brace. Glue can be used for extra reinforcement.
13. Finish the table as desired.





LIST OF MATERIALS

(finished dimensions in inches)

A	Spindle	2 dia. × 21-1/4
B	Top	3/4 × 16 dia.
C	Legs (3)	3/4 × 7-1/4 × 7-1/2
D	Top brace	3/4 × 3 × 12
	Wood screws	
	Dowels (10)	3/8 dia. × 1-1/2
	Wood glue	

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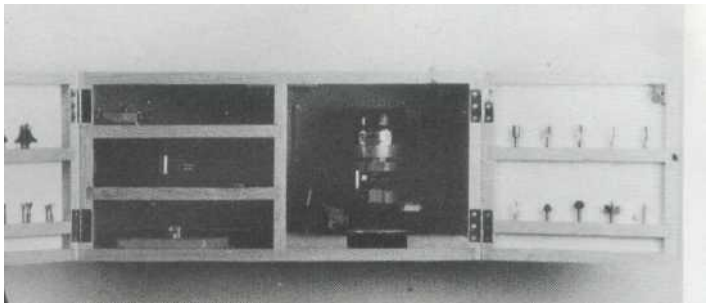
ROUTER CADDY



The router is one of the most versatile tools in any workshop. There is little you cannot do with a router and the proper accessories. The router caddy shown here is designed to store your router on a pad so that the router bit does not have to be removed from the collet. Extra bits are displayed in the recessed door frames against a white background that makes identification easy. Three shelves are large enough to hold wrenches, guides, and other accessories.

The plans and dimensions given here are for a typical 1 to 1-1/2 horsepower router. If your router requires more or less space, adjust the dimensions to suit.

1. Begin by cutting the top and bottom (A) and sides (B) to length. Rabbet the top and bottom edge of the sides 3/4" wide and 3/8" deep.
2. Machine a 1/4" x 1/4" rabbet in the back edge of the sides, top, and bottom for the back panel. Dado the top and bottom along the centerline 3/4" x 3/8".
3. Cut the divider (C) and shelves (D) to length. Rip 1/4" from the back edge of each to allow room for the back panel. Machine 3/4" x 3/8" dadoes in the divider and left side to accept the shelves.
4. Assemble the sides, top, bottom, divider, and shelves. Glue and nail together with 4d finishing nails.
5. Cut the back (E) to size and let into the back rabbet. Secure with glue and 4d finishing nails.
6. Cut the pads (F) to size and round the front edge using a 1/2" edge rounding router bit. Glue and nail to the bottom of the router compartment as shown. Sand and finish the caddy as desired.
7. Cut the 3/4" x 1" door frame members to size. Rabbet the stiles (G) to accept the rails (H) in a half-lap joint. Machine the notches 3/4" wide and 5/8" deep.
8. Machine 3/4" x 1/4" dadoes in the side frame members to accept the struts (J). Cut the struts to size and drill holes spaced 1" apart to accept the router bit shanks.
9. Cut the door panels (K) to size. Paint the inside of the door panels white.
10. Glue and nail the door frames together. Rout a 1/4" x 1/4" rabbet in the inside edge of the frame.
11. Square the corners and secure the door panel in the rabbet with glue and 2d finishing nails. Sand and finish as desired.
12. Mortise hinges into each door frame and into the caddy sides. Space the doors 1/8" apart and fasten to the caddy.
13. Attach magnetic catches and porcelain knobs. Hang the caddy at chest level.

LIST OF MATERIALS

(finished dimensions in inches)

A	Top and bottom (2)	3/4 × 7-1/4 × 21-1/2
B	Sides (2)	3/4 × 7-1/4 × 10-1/4
C	Divider	3/4 × 7 × 9-1/2
D	Shelves (2)	3/4 × 7 × 10-3/4
E	Back	1/4 × 10-3/4 × 21-1/2 plywood
F	Pads (2)	3/4 × 3-1/2 × 7
G	Stiles (4)	3/4 × 1 × 10-1/4
H	Rails (4)	3/4 × 1 × 10-1/16
J	Struts (4)	3/4 × 3/4 × 10-1/16
K	Door panels (2)	1/4 × 9-1/4 × 10-1/16
	2d finishing nails	
	4d finishing nails	
	2″ butt hinges (4)	
	Porcelain knobs (2)	
	Magnetic latches (2)	
	Wood glue	

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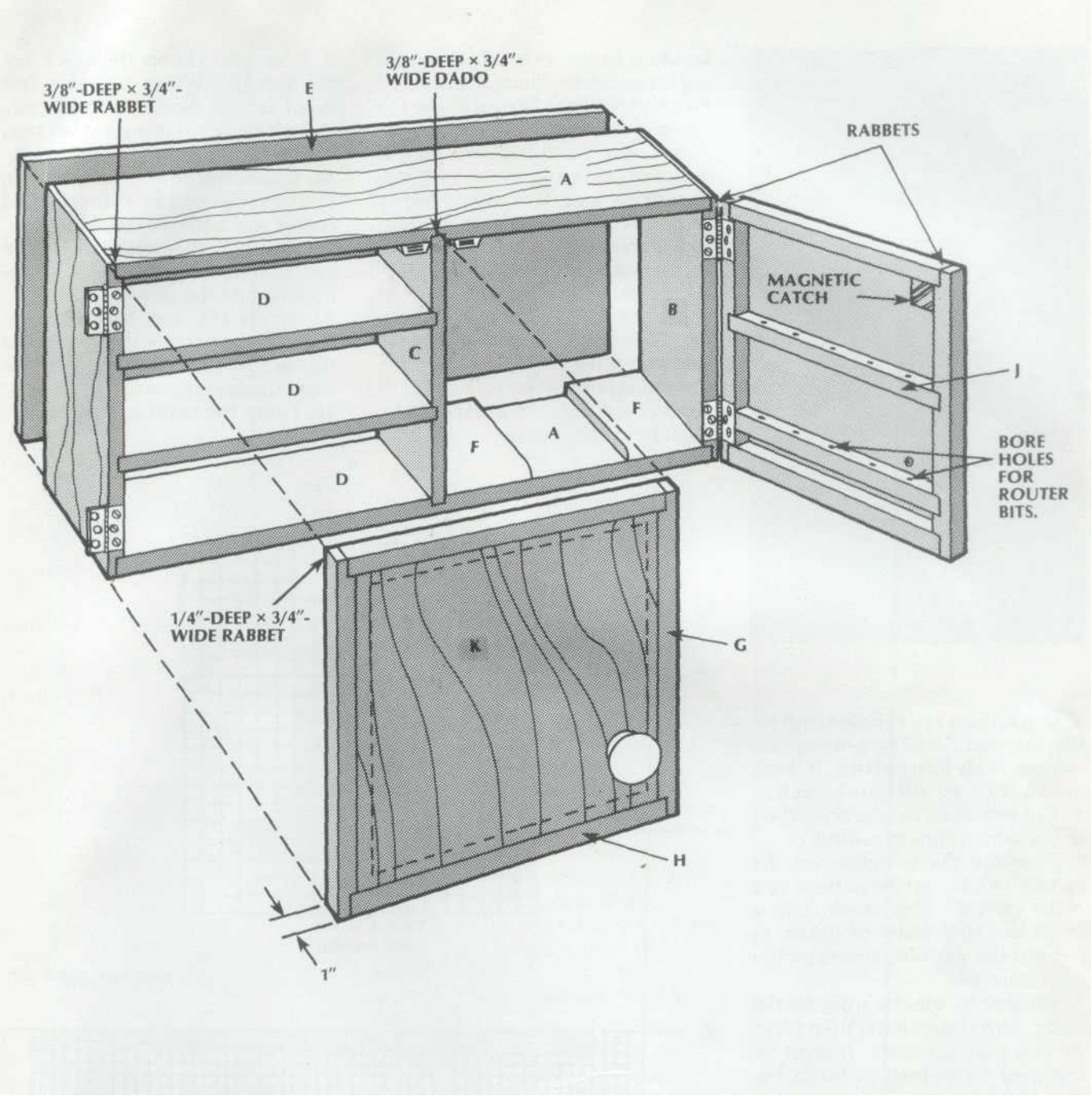

3/8"-DEEP × 3/4"-
WIDE RABBET
E
3/8"-DEEP × 3/4"-
WIDE DADO
RABBETS
A
D
C
D
B
MAGNETIC
CATCH
J
F
A
F
D
BORE
HOLES
FOR
ROUTER
BITS.
1/4"-DEEP × 3/4"-
WIDE RABBET
G
K
H
1"

HERB DRYING RACK

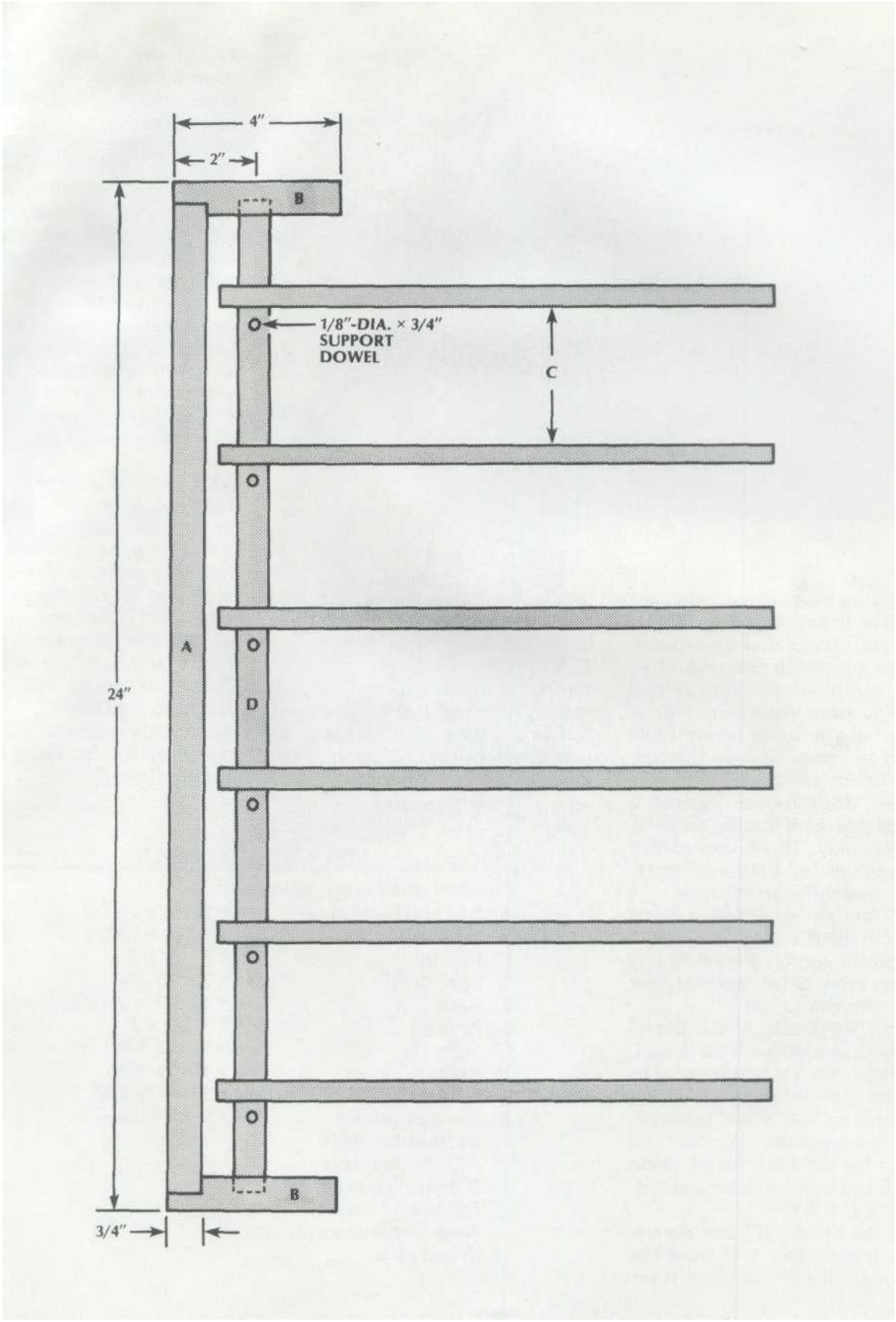
Whether or not you are an herb gardener, you will enjoy the rustic flavor this herb drying rack will add to your kitchen. Designed after a much larger Shaker herb rack, this project can be used to display dried flowers, hanging pots, or whatever else your imagination can muster. The rack is designed to be fastened to a wall. When not in use, the horizontal drying bars fold conveniently against the wall, out of the way of traffic. When in use for the summer herb harvest, it provides a handy place to hang bundles of herbs. Best of all, the simplicity of design allows this project to be completed in an afternoon, with basic hand or power tools. The dimensions can be lengthened or shortened to suit individual tastes.

1. Cut all the pieces to size.
2. Round the front edges of the top and bottom end pieces (B) on a jigsaw or bandsaw.
3. Drill a 1/2"-diameter hole, 3/8" deep, in the middle of the top sur face of the bottom end piece and the bottom surface of the top end piece. NOTE: Drill the holes about 2" away from the back edge to al low the horizontal pieces (C) to piv ot without hitting the wall piece (A).
4. Drill a 1/2" hole through the center of each horizontal piece, 1" from the back edge for insertion of the support dowel (D).
5. Cut a 3/8"-deep * 3/4"-wide rabbet on the back edge of the top and bottom end pieces for joining to the wall piece.
6. Cut a tapering chamfer on all four edges of each horizontal piece. Start the chamfer 5" in from the back edge of the piece, increas ing the taper to a full 1/4" at the front edge.
7. Drill dowel holes in the support dowel at the desired positions un derneath the horizontal pieces (as shown).
8. Sand all pieces. If the support dowel fits too tightly, sand it. Do not redrill the holes or you risk making the horizontal pieces fit in a flimsy way.
9. Assemble the horizontal pieces on the support dowel, place the dowel in the holes in the top and bottom end pieces, then glue and nail the end and wall pieces to gether.
10. Finish as desired.

LIST OF MATERIALS

(finished dimensions in inches)

A	Wall piece	3/4 × 3-1/2 × 23-3/4
B	End pieces (2)	3/4 × 3-1/2 × 4
C	Horizontal pieces (6)	3/4 × 1-1/4 × 20
D	Support dowel	1/2 dia. × 23-3/4
	1/8-dia. × 3/4 dowels	
	4d finishing nails	
	Wood glue	



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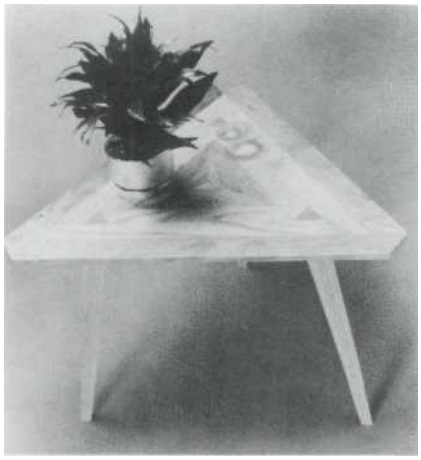
TRIANGULAR TABLE



Here's the solution to uneven tables that constantly wobble: a three-legged triangulartable. While the idea is a simple one, figuring out the angles provided a challenge. The result is a sturdy table with tapered legs that fit into mortises formed by bevels and compound miters. To build it, use the following step-by-step procedure:

1. Choose wood for this project that is both strong and stable. Ash and cherry were used in this example; the harder ash is ideal for the legs and leg mortises, with the cherry serving as a contrast in the areas of less strain.
2. Because the tapered legs (E) go entirely through the tabletop, the mortises into which they fit must be a particular angle and shape. The easiest way to accomplish this is to construct these angled mortises with beveled and angled parts to make up the tabletop. Begin construction by cutting out on a bandsaw the three isosceles triangles that form the inside of the tabletop (A).
3. Disc sand the triangles so they are identical, then mark the bottom of each one with an X. Cut 1/4"-wide x 1/2"-deep spline grooves on the two inside edges of each triangle, making sure that the X is kept away from the rip fence.
4. Glue and clamp the triangles together. After the glue has dried, use a disc sander to touch up the outside edges of this inner triangle.
5. The top middle pieces (B, C) also form the leg mortises. This means that each part must have one beveled edge, one mitered end, and one compound mitered end. First, cut three pieces of stock that measure 1-1/2" x 1-3/4" x 14".
6. Tilt the saw table 5° and bevel one edge of each board. Mark an X on the wide edge of each board to indicate the bottom side. Now return the table to 0°, set the miter gauge at 60°, and miter one end of each board.
7. Place the three boards (B) around the inner triangle and mark
for length. With the miter gauge still set at 60°, tilt the table 14° and cut the opposite end of each board. The undersides should now be longer and wider than the tops.
8. Cut matching spline grooves in each of the boards, identical to those made in step 3. Clue and clamp the boards to the inner triangle.
9. To complete the leg mortises, cut three pieces of stock (C) that measure 1-1/2" x 1-5/8" x 20". Tilt the saw table 5° and bevel one edge of each piece. This bevel matches those made in step 6 on the shorter middle boards (B); the result is that these boards will be wider on the top than on the bottom.
10. Mark the lengths of the three boards from the assembled central section. With the table set at 5° and the miter gauge set at 60°, miter one end of each piece.
11. The final operation on these boards is to bevel the undersides. Tilt the table 30° and, with the 5° beveled side facing up, cut each board so it tapers from 1-1/2" thick on the beveled edge to 3/4" thick on the outside edge.
12. Glue and clamp the boards to the central assembly. When the glue has dried, disc sand the corners on the underside of the table to match the bevel.
13. Drill a 3/8"-diameter hole 3-1/2" deep through the long middle boards as shown, joint, and glue dowels in place to reinforce the joints.
14. The edge pieces (D) complete the top. Cut the pieces to size, then set the table at 0°. With the miter gauge set at 60°, miter one end of each piece.
15. Tilt the table 15° and bevel the bottom side of each piece, tapering the bottom from 3/4" down to a 1/2" edge.
16. Glue and clamp the edge pieces to the main assembly. With the bandsaw, cut off the corners and disc sand to the final dimension.
17. To make the legs (E), start with three 4"-wide pieces of 1-3/4"-thick stock. Tilt the table to 30° and adjust a tapering jig to cut a 2-1/2° taper on a 20"-long piece of stock. Mark an X on the top of each leg, then make one pass on each leg. Use a push stick for this to keep the wood secure.
18. Flip the stock over end for end;
the X should now be on the underside of the legs. Move the rip fence about 1/2" closer to the blade; the triangle formed by the saw kerf and the blade should be 3/4" on each side.
19. Cut the remaining tapers, then test-fit the legs in the mortises. Mark the legs where they come through the bottom of the table top, then remove them. With the miter gauge set at 14°, disc sand the legs to equal length.
20. Apply glue to the legs and the mortises, then tap the legs in place. Cut off the top remainder of the legs with a handsaw.
21. Belt sand the top to make the tabletop surface flush. Finish as desired.

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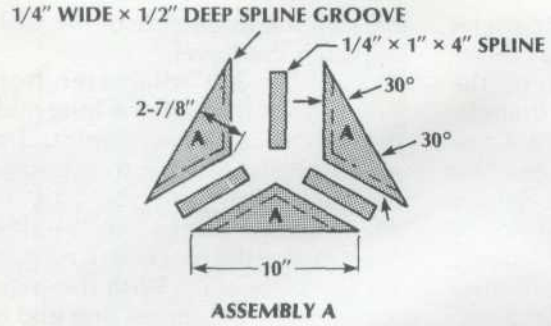
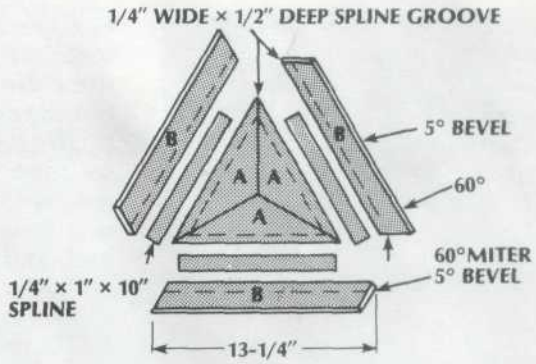
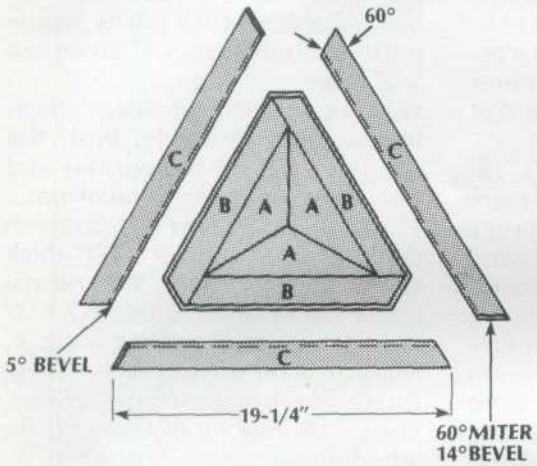


ASSEMBLY A



ASSEMBLY B



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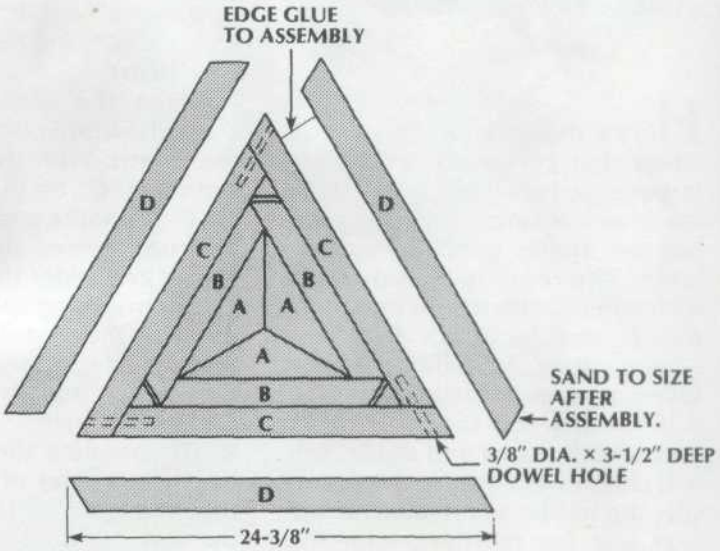
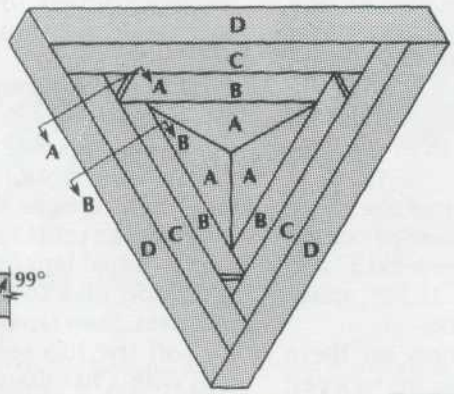
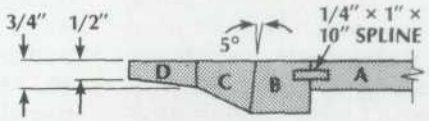


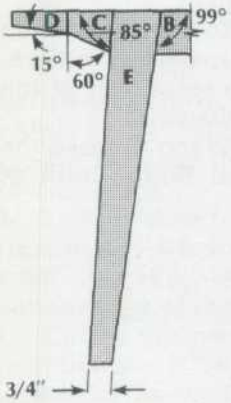
ASSEMBLY D

FINAL ASSEMBLY DETAIL





SECTION B–B



SECTION A–A

LIST OF MATERIALS

(finished dimensions in inches)

A	Top, inside pieces (3)	3/4 × 2-7/8 × 10
B	Top, middle pieces (3)	1-1/2 × 1-3/4 × 13-1/4
C	Top, middle pieces (3)	1-1/2 × 1-5/8 × 19-1/4
D	Top, edge pieces (3)	3/4 × 2 × 24-3/8
E	Legs (3)	1-3/4 × 2 × 16
	Dowels (3)	3/8 dia. × 3-1/2
	Spline material	1/4 × 1 × 42 tempered hardboard
	Wood glue	

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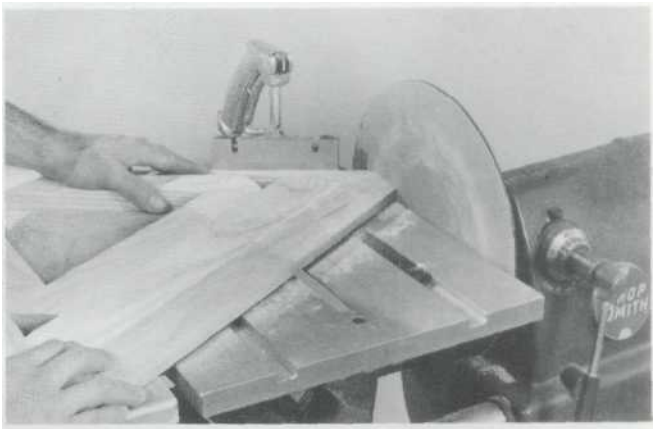
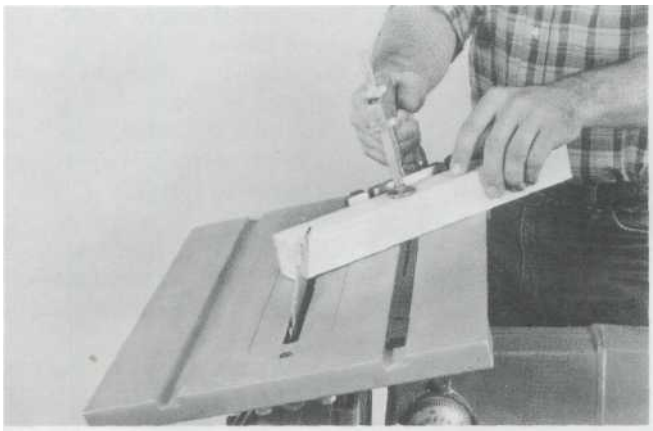
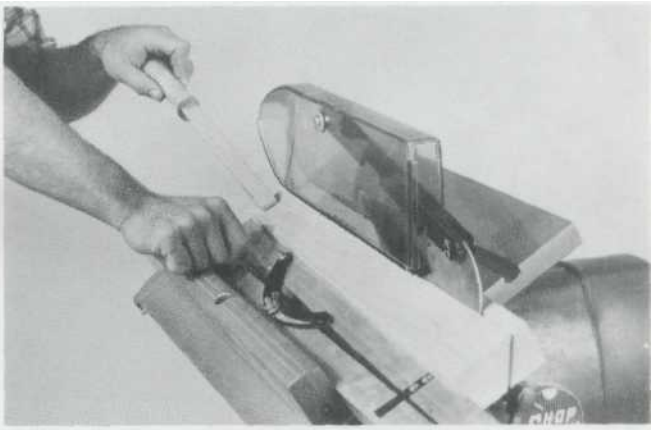
Glue and clamp triangles together.



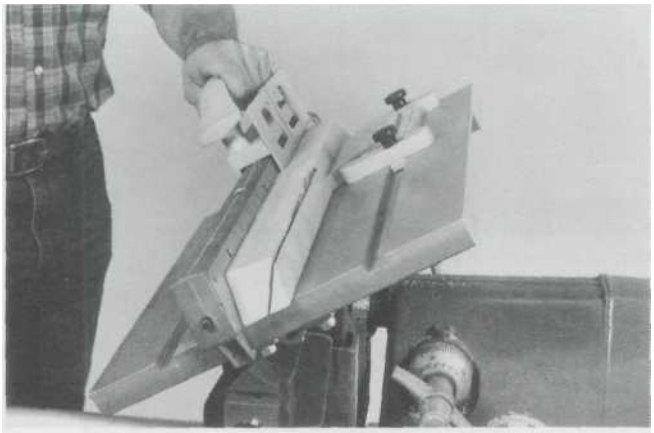
With bandsaw, cut off corners and disc sand to final dimension.



With miter gauge set at 60°, tilt table 14° and cut other end of each part. (Saw guard removed for clarity only.)



Make one pass on each leg.



Cut stock so it tapers from 1-1/2" thick on beveled edge to 3/4" thick on outside edge. (Saw guard removed for clarity only.)

Triangle formed by saw kerf and blade should be 3/4" on each side. (Saw guard removed for clarity only.)

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ARTIST EASEL

Here's a materials list with everything you need to follow the plans. I'll explain in more detail later, but the easel I built will hold a 7' tall painting, has a 4' wide shelf and stands about 7 1/2' tall total.

Wood:

(8) 2x4, 8' pine
(1) 1x2, 8' poplar

(1) 1x2, 2' pine
(1) 1/2" hardwood dowel

Hardware:

approx. 50 3" all-purpose phillips coarse thread screws
(1) 3/8" thumb screw (about 1.5" in length should do)
(4) 3 1/2" door hinges with screws
(4) lockable wheel casters (2 1/2" diameter)
(2) 4" long, 1/2" diameter carriage bolts
(6) 1/2" washers
(2) 1/2" hex lock nuts (nylon insert)
(2) 4" long, 3/8" diameter hex bolts
(2) 3/8" washers
(2) 3/8" wing nuts
(1) 3/8" square nut

Tools:

smallish crosscut hand saw
backsaw w/ mitre box
dovetail saw (optional)
1/2" wood chisel
phillips screwdriver
adjustable carpenter's square (with bubble level)
tape measure
power drill w/ bit set (up to 1/2")
jigsaw with wood cutting blade
a table or bench to construct on
some clamps

Below you'll find the plans to the easel I built, with all the lengths, dimensions, etc. However, as we go along, I'll point out what you need to do to extend this design to suit any size painting.

fig. 1: side angle

fig. 2: front angle

Above are pictures of the finished easel and its supporting measured drawing below. I will stick with this format throughout the site. The diagrams are fairly self-explanatory, but let me explain the few possibly confusing things. In figure 4, notice where it says 'chisel for ctr. support'. If you look at the photo above, you may be able to tell that the center support (1x2x7.5) is actually sitting inside a notch in the bottom

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horizontal brace, so that its face is flush with the brace. Here's a closeup of the front of the bottom brace:

fig. 3: bottom brace with chiseled center support recess

This is essential so that the adjustable shelf, which isn't attached to that center support in any way, lies flush against it. This way, if you have a painting which is narrower than 3 feet, it can simply lay against the center support. Also notice the spacers in Fig. 5. These are narrower than the center support so that the top clamp can easily slide up and down the center support (more later).

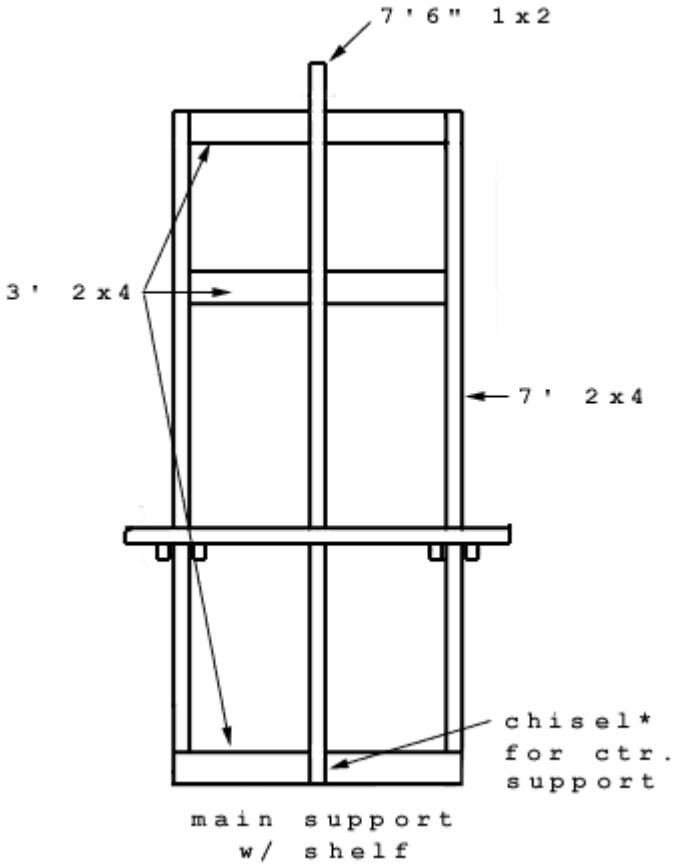


fig. 4: front angle (measurements)

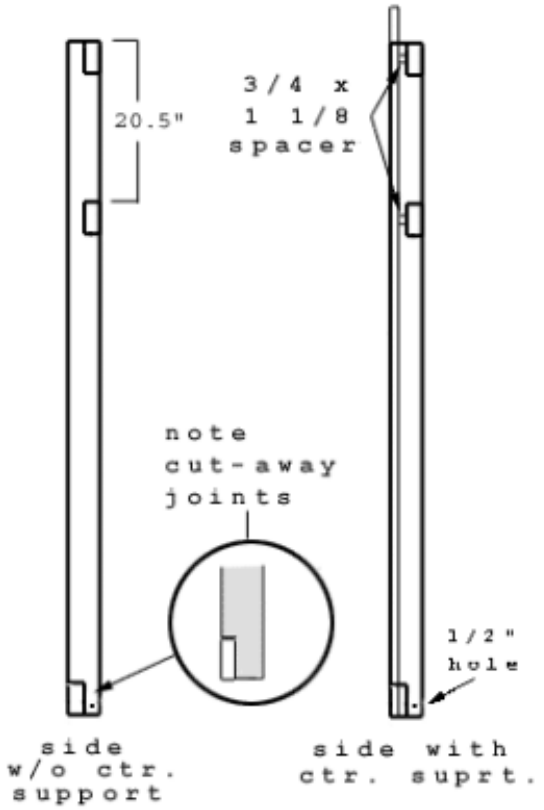


fig. 5: side angle (measurements)

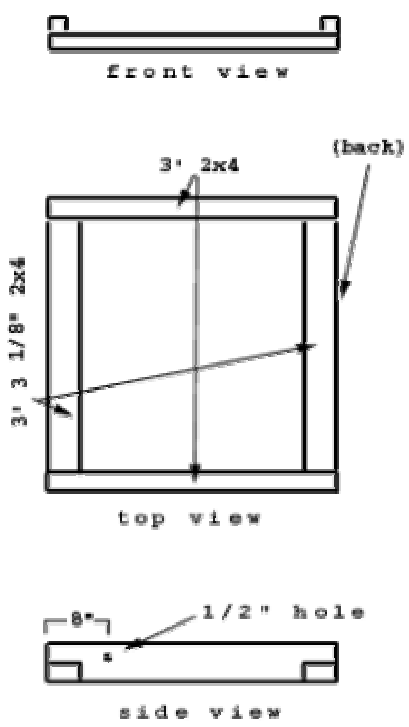
All of the lengths of the pieces for this section of the easel are listed in the drawings above. All pieces are screwed together with No. 8 x 3" screws (as listed in the materials list). Make sure you drill pilot holes for each screw before you drive it...something like 3/32 should do it. You might want to experiment on a test piece first.

Notice the joints--I've cut out pieces of the vertical supports to hold the horizontal supports in place. The top two supports are attached on the back half of the vertical supports so that the shelf can slide freely up and down the vertical supports. See the close-up drawing in Fig. 5 or look closely at the joints in the easel pictures.

NOTE: This is the piece you want to modify if you want this easel to hold taller paintings. Essentially all you need to hold a taller painting will be a taller center support. Simply change the 7'6" support to whatever height you want. However, if you think you will go *much* higher, say 10'+, you might want to consider increasing the length of the whole piece by extending the two outside vertical supports as well.

fig. 1: side angle

fig. 2: front angle



The base is very simple to build. Its side pieces are 3' each and attached in a tall orientation. Its front and back are 3' 3 1/8" each in a laid-down orientation. The extra length on the front and back is so that the distance between the two side pieces is large enough to accomodate the 3'-wide frame in addition to a bit of wiggle room for a couple washers. Notches are cut into each side piece to accomodate the flat front/back pieces (see side view). One hole is drilled on each side piece, 8 inches back from the front of the base. This hole will accept a 1/2" x 4" hex bolt w/ washers to bolt the main support to the base. By using a bolt here, the main support's angle is adjustable (and secured with the back-side slot setup--more later).

fig. 3: front/top/side angle (measurements)

Not much more to it than that for the base. The locking casters will attach to the bottom of this piece, but I put those on last. Not sure if that made the most sense, but I didn't want the thing rolling around while I was trying to put it together. For the casters, I used 2 1/2" tall locking casters and some wood screws to screw them directly into the base on each corner. You need to make sure they are close enough to the corners so that you can get at the locks with your feet. In hindsight, larger casters might have been a better choice.

The rear supports allow you to tilt the angle of the main support to a comfortable position. By loosening the two wing nuts, you can adjust the angle from 90 degrees (straight up) to 45 degrees back, to even a little forward (i.e. 90+)--good for pastels..

The rear supports look more complicated in the diagrams than they really are. Each support basically consists of two 2x4's, one slotted and one with a bolt that slides in the slot. By tightening the wing nut on the bolt, you can set the adjustment where you want.

fig. 1: rear supports

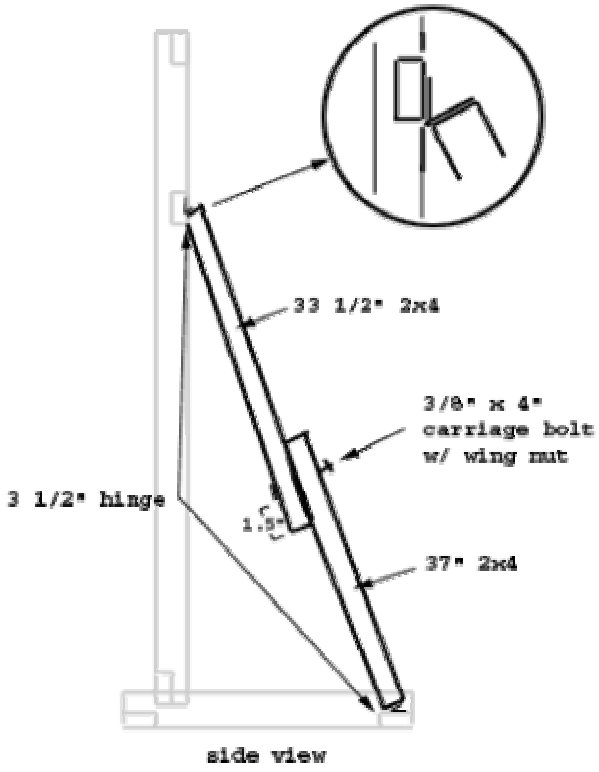


fig. 2: side view of rear supports (measurements)

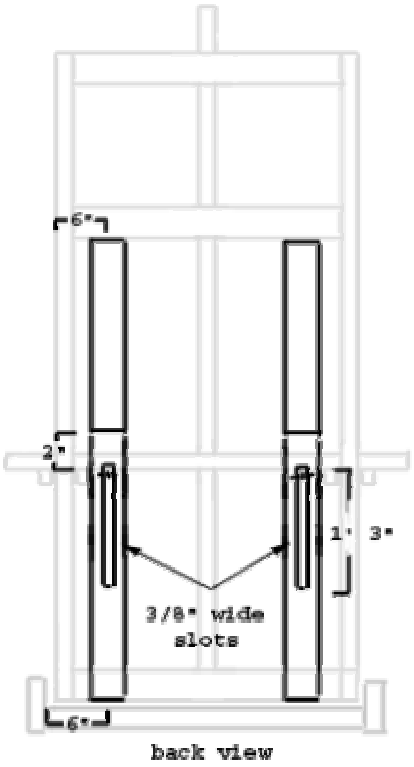


fig. 3: rear view of rear supports (measurements)

Cut two 33 1/2" 2x4's and two 37" 2x4's. 1.5" from the end of the 33" 2x4's, drill a 3/8" hole in the center. This hole will hold a 4" long, 3/8" diam. carriage bolt. The carriage bolt has a square bit under the head so that it digs into the wood. This enables you to tighten the wing nut w/o having to hold onto the other end of the bolt. Kind of like embedding the bolt into the wood. On the other end of each of these pieces, attach one side of a 3 1/2" wide hinge. This hinge will eventually get attached to the appropriate brace on the main support.

fig. 4: rear support detail (front)

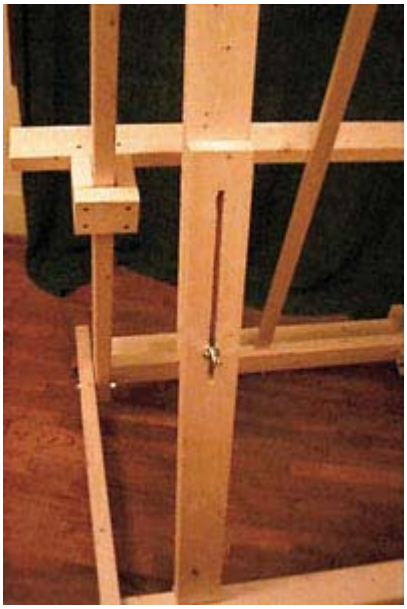


fig. 5: rear support detail (rear)

In the 37" 2x4 you will need to cut a 1' 3" long slot which is 3/8" wide. This is the slot that the carriage bolt will slide through when you adjust the angle. I cut this slot using a jigsaw (also called a scroll saw). First, mark the beginning and end of the slot. Using a 3/8" drill bit, drill a hole at the beginning and end of the slot. This will give you a starting and ending point from which to insert the jigsaw blade. Draw an outline of the slot between each hole so you have a guide and saw out the slot. I found this a bit tough (hadn't used a jigsaw before), but as long as you don't go way outside the lines, you can always fix it up. Once you've drilled out the slot, take a 3/8" bolt and slide it through the length of it to make sure you have sufficient width along the entire length. (Those with routers already know how easy this will be for them).

Steve Baird from Australia sent in the great suggestion of clamping down another board to act as a guide for the jigsaw to ride against. He says "simply measure the distance between the blade and the edge of the base on the saw to calculate the position to clamp the guide. Don't forget to allow for the width of the saw blade. If the rear support is not wide enough then clamp another piece of timber next to it to support your guide."

Attach another hinge to the bottom of this piece, in the same manner you did to the top piece. Leave the assembly until we've completed a few more steps.

The adjustable shelf is just that; it allows you to change the height at which the painting is supported; both to allow accomodate large supports, as well as to provide a comfortable painting height for sitting and standing.

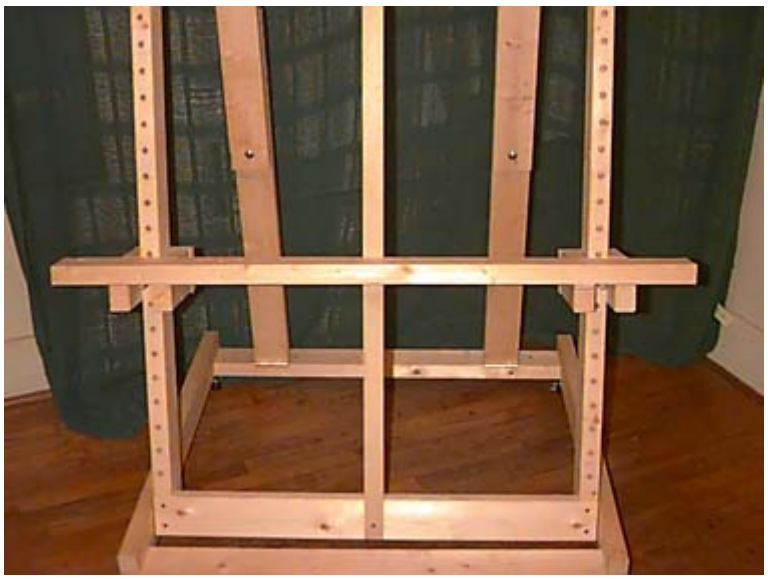


fig. 1: shelf front angle

Admittedly, the shelf design is a potential weak spot in my design. It doesn't slide up and down as easily as I would like. Once you get the hang of it, it works. This is really the part that could benefit from some higher-end tools. If you look at easels in stores, you'll see the shelf design either utilizes wood cuts that you can't do by hand or specialized metal components. I will say one thing for my shelf, though--its is VERY sturdy. I figure with huge paintings, I also won't be raising and lowering all the time either. If someone has an improvement on this design that can be made with (or without) fancier tools, I'd be happy to include it here.

Others who have built this easel have tried various modifications of this shelf design. One person used joist hangers to support the shelf. Another put a slot in the main support and tightened the shelf into

place, like I do with the rear supports.

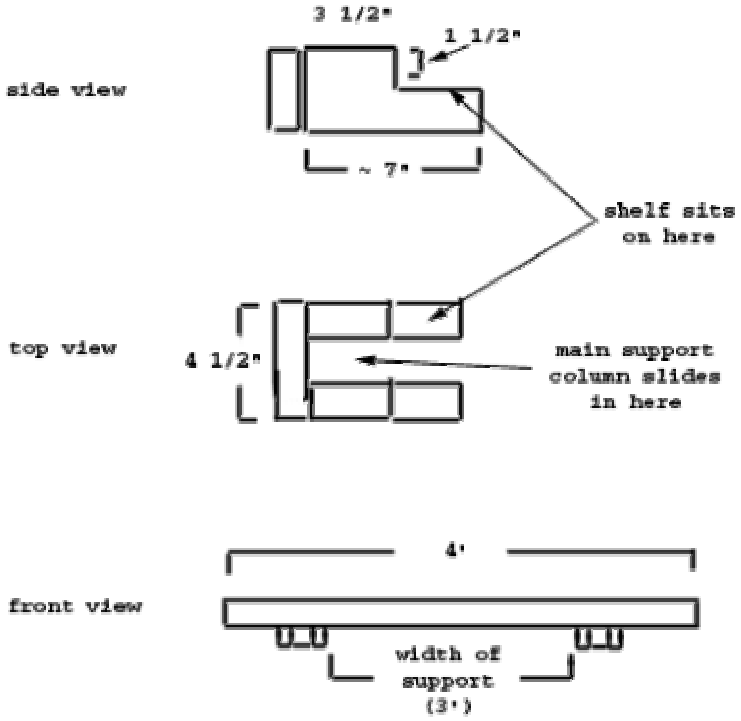


fig 2: shelf diagram (measurements)

The shelf is made up of two identical U-shaped pieces which attach to the shelf itself. The shelf is a simple a 4' 2x4. Each U piece wraps around the vertical outer pieces of the main support (see figure 3). The best way to measure up this piece is to lay the pieces up against your actual support and mark the pieces so they fit just right. However, my measurements should be close and give you a starting point. The idea is to make the center gap *just* the width of the main support piece, so that the U piece can slide firmly up and down the support.

The order to build this is to build each U-shaped piece first. Then, once you have those done, put them in place on the main support, lay the shelf on and try it out while holding the shelf and U-pieces together with your hand. If it's satisfactory, put a couple screws in each shelf while its actually in place (at his point, you have no other way to actually get the shelf on the thing).

fig 3: shelf support detail (rear)

fig 4: shelf (up)

The final piece of the shelf system is the shelf support rods. Each side of the shelf is locked into place by placing a 1/2" diameter dowel rod into a pre-drilled hole along the main support (see Fig. 4). The holes are drilled in the face of the main support and each hole is 2" apart, and centered horizontally. The holes are 1/2" in diameter. Drill them up as high as you want the shelf to go. This does hold the shelf very sturdily in place.

I borrowed a tool called a 'dowel-cutting jig' to drill the holes accurately. The jig is basically a clamp with a guide in it. You set the guide where you want (in this case, so that the center of the hole is in the center of the support), clamp it into place, and drill away. This helped me keep each hole nicely lined up. You could do this w/o, but if you can borrow one of these things, it makes it easier. They cost about $30 (too much for one use), but my dad had one in his basement he hadn't used in 30 years that worked perfectly (and the pricetag on the box was $6!).

Finally, cut a couple pieces of 1/2" dowel and slip them into place.

The top clamp allows you to clamp down a canvas once it's on the shelf. This keeps it from flopping around or falling forward. The way I did it, the clamp is a bit tricky to make, but not too bad. One could easily substitute multiple pieces instead of cutting out the 'T' shape like I did (as Pat B.--see the gallery).

fig. 1: clamp (front)

The clamp is made from two pieces; a 5" 2x4 and a 1' 1x2. The 2x4 has a "T" shape cut out of the back of it (see Fig. 2). The top of the T slides down the center support, and thus is just a bit larger than the 1x2. The skinny part of the T is about 1" wide, just a bit wider than the spacers that sit between the center support and the horizontal braces on the main structure.

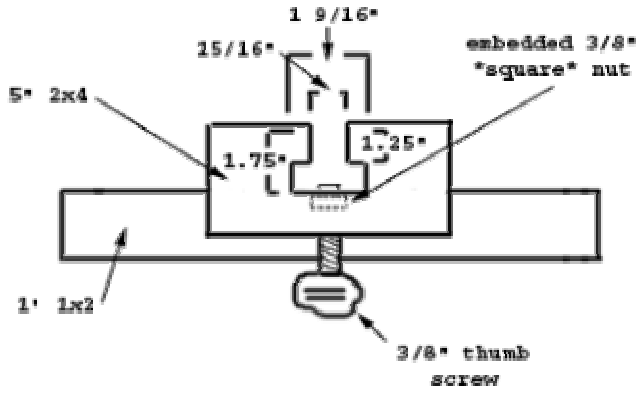


fig 2: top clamp diagram (measurements)

To cut the slot out of the 2x4, I cut a 1 9/16" cut all the way back 1.75". Then, I used a my jigsaw to rough-cut the larger portion and finished it off with a chisel (see Fig. 3). Not easy and takes some to get it to fit, but it works. Then, in the center of the back of the cut, you need to chisel out a square hole *just* big enough for a square 3/8" nut. This nut is what the thumb-screw screws into. It's square so that when you turn the screw it doesn't also turn the nut (the square nut stays firm in its square hole). Finally, drill a 3/8" hole directly into the center front, through to the newly-cut opening.

To finish it off, glue the 1x2 to the bottom of the 2x4 as shown, screw the thumbscrew into place and you're set for the clamp.

Note that it's really best to measure against your exact pieces here, instead of following my directions. Hold the 2x4 up against the center support and draw around it. Do the same with one of the spacers behind the center support (or measure if you can't get to it). My measurements should work for you, but you'll get a better fit if you measure against the actual pieces. This piece works best if it really *just* fits. That way, you can raise the clamp and don't have to tighten the screw just to keep it up for a minute while you raise the shelf, etc.

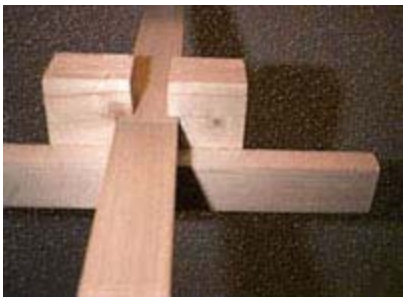


fig 3: clamp cutout detail (rear)

As an aside, I should say that my first clamp finally broke one day. While wood glue will fix it up just fine, the point at which it broke is in the middle where I had cut out the most wood. For this reason, I highly suggest trying the multiple piece design illustrated so well by Pat B.

You now have all the pieces and can put the whole thing together!

fig. 1: side angle

fig. 2: front angle

If you want wheels, now is the easiest time to add them. Turn the base over and lay it on the floor. Get your casters, line them up on the edges of each corner and screw them in.

Now you need to screw the main support into the base. You'll want the easel against a wall, or actually, a doorway works well, so you can get behind the easel easily. This way the main support has something to rest on. Take your 4" x 1/2" bolt and stick it into the hole so it just pokes through the other side of the base. Then get one of your washers and hang it on the bolt so that it obscures the bolt. Then you can slide the main support into place. Wiggle around a bit and you should be able to get the bolt all the way through the main support. On the other end, place another washer, and then a 'locking' hex nut. The locking nut 'locks' because it has a bit of nylon on the outer end, which gives it some good anti-slip once it's on (you can still remove it if you need to). Lock-tight or other similar products would work here as well. Follow the same procedure for the other bolt on the other side.

Now you want to add the rear supports. If you followed the directions previously, you have hinges screwed to the supports already. Now you need to screw the other end of the hinge into the appropriate place on the base for the 37" pieces, and the second horizontal piece on the main support. Look back at the diagrams in 'rear supports' if you don't remember (the placement of the hinges is presented there in fig. 3). Once you have the hinges screwed in, you can put the carriage bolt of each top piece into the slotted bottoms pieces--add a washer and your wing nut.

If you didn't actually screw on the shelf before, now's the time to do it. Place the U-shaped pieces around the vertical pieces on the main support. Place the shelf into place--measure each side to make sure you have it centered, and put a couple screws on each side to screw the shelf onto the U-shaped pieces.

If you haven't already, go ahead and slide the clamp onto the center support...

BABY CHANGING TABLE

Construction

Tools required: router, drill, sander

Wood required: pine and plywood

Description	Qty	Width	Thickness	Length
Front frame				
Small verticals	2	2 1/4"	3/4"	32"
Long verticals	2	2 1/4"	3/4"	35 1/2"
Top/Middle long horizontals	3	2 1/4"	3/4"	30 1/2"
Base plank	1	2 1/4"	3/4"	47"
Top/Middle short horizontals	2	2 1/4"	3/4"	14"
Rear Frame				
Small verticals	2	2 1/4"	3/4"	32"
Long verticals	2	2 1/4"	3/4"	35 1/2"
Top long horizontals	1	2 1/4"	3/4"	30 1/2"
Base plank	1	2 1/4"	3/4"	47"
Top short horizontal	1	2 1/4"	3/4"	14"
Side panel (small)				
Verticals	2	2 1/4"	3/4"	32"
Top/bottom	2	2 1/4"	3/4"	16 1/2"
Side panel (large)				
Verticals	2	2 1/4"	3/4"	35 1/2"
Top/bottom	2	2 1/4"	3/4"	16 1/2"
Middle panel (plywood)	1	16 1/2"	1/2"	4"
Tops				
Large (plywood)	1	19 1/2"	1/2"	34 1/4"
Small (plywood)	1	19 1/2"	1/2"	18 1/2"
Edging (large top)	1	3/4"	1/8"	55"
Edging (small top)	1	3/4"	1/8"	60"

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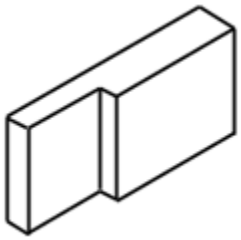
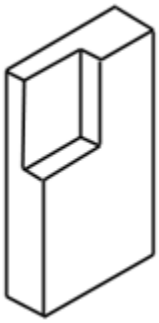
Molding (large top)	1	3/4"	3/4"	55"
Molding (small top)	1	3/4"	3/4"	60"
Base board				
Front	1	3"	3/4"	51"
Side	2	3"	3/4"	19"
Large drawers				
Sides	6	5 1/2"	3/4"	16 1/2"
Inner Front/back	6	5 1/2"	3/4"	26"
Front	3	9"	3/4"	30 1/2"
Knobs	6			
Narrow drawers				
Sides	4	10"	3/4"	16 1/2"
Inner Front/back	4	10"	3/4"	9 3/4"
Front	2	14"	3/4"	16 1/2"
Knobs	2			
Back panels				
Large (hardboard/plywood)	1	32"	1/8"	32"
Small (hardboard/plywood)	1	16"	1/8"	35 1/2"</TD< tr>

1. Prepare front frame pieces (left side)

Firstly, cut lap joints that are 1 1/2" in from each end into the two top pieces (long and short), the middle drawer pieces (two long, one short) and the base plank. Next, cut a slot out of the base plank 13" from the right and 29 1/2" from the left (hence, 4 1/2" wide). Note that when deciding which end is the right and left of this plank, lie the plank flat on the ground with the cut out lap joint part facing upwards (see diagram).





Now that all of the horizontal pieces are prepared, we need to prepare the vertical planks. Firstly, take one of the two shorter vertical pieces and nominate it as the left vertical. Cut out grooves that are 3/8" deep and 1 1/2" in (matching the cut on the horizontal pieces) at the following positions from the bottom:

- Bottom to 2 1/4" high
- 10 3/4" to 13"
- 20 1/2" to 22 3/4"
- 29 3/4" to top

Next, take the second small vertical and nominate it as the middle-right vertical. Make a mirror image of the above grooves in this piece, so that the horizontal planks will slot in. The one difference is that the base to 2 1/4" high cut should be made as a lap joint (i.e. all the way across the wood, rather than just 1 1/2" in) in order to slot into the middle groove cut out of the base plank.

2. Prepare front frame pieces (left side)

Now take one of the two longer vertical planks and nominate it as the right vertical. Cut out grooves that are 3/8" deep and 1 1/2" in (matching the cut on the horizontal pieces) at the following positions from the bottom:

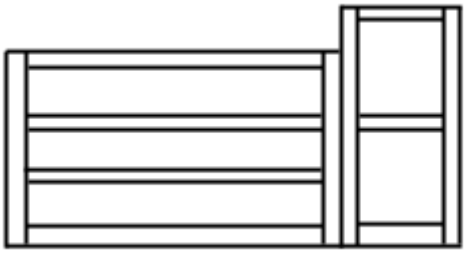
- Bottom to 2 1/4" high
- 17 1/2" to 19 3/4"
- 33 1/4" to top

Next, take the second long vertical and nominate it as the middle-left vertical. Make a mirror image of the above grooves in this piece, so that the horizontal planks will slot in. The one difference is that the base-to-2 1/4" high cut should be made as a lap joint (i.e. all the way across the wood, rather than just 1 1/2" in) in order to slot into the middle groove cut out of the base plank.

Finally, take the middle-right and taller middle-left planks and glue them together, side by side. To make this joint use either dowel joints or biscuits. The result should be a double width piece that has one side taller than the other. Not that when looking at this piece from the front, it should look like one solid piece - the grooves should be in the back, not the front.

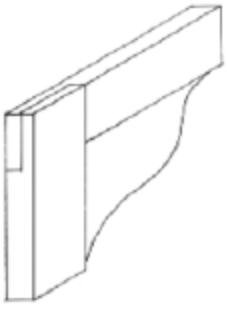
3. Glue front frame together

Once the middle, double plank has dried, it is time to connect the rest of the front together. Glue and screw the pieces together, ensuring that the finished frame is square. To help build a solid frame, clamp overnight to ensure a strong bond.



4. Prepare back frame

The back frame is relatively simple to construct as it consists only of an outer frame. Repeat step 2, but omit the horizontal planks that define the drawer spaces (but include the inner-left and inner-right vertical planks that are glued together as on the front). One prepared, glue the pieces together (as with the front). Again, ensure that the frame is square.



5. Build left (small) side panel

Take the two vertical side pieces and cut lap joints into them, and matching lap joints in the two small horizontal pieces. By so doing, the four pieces should fit together into a rectangular frame (see diagram). Next, rout out a groove on the inner, back edge of all four pieces. This groove should cut in 1/2" and be 1/2" deep.

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By making this groove all the way around the inside edge, the plywood sheet that forms the side panel can rest in place. Once routed, glue and screw the four side planks together - making sure the joints are square - and then glue the plywood panel into place in the center (which will help strengthen the unit.

6. Build right (larger) side frame

Repeat step 5 for the right hand panel. Remember that this panel is larger due to the fact that the right side of the front frame is also taller.

7. Build main frame

Now that the two sides, front and back have been built, it is time to put them together. Sandwich the left hand side panel between the front and back panels and screw the three pieces together by driving screws through the front frame into the side as well as from the back frame into the side panel. Then attach the right hand panel to complete the frame. Make sure that the completed frame is square.

8. Add middle panel

Next, add the small middle panel, gluing and screwing it into place. This panel should fill the small void at the point where the front/back steps up from the lower height to the taller level. At this time you should also add a small strengthening bar to the bottom middle of the frame, running from front to back. To add it, glue and screw into place from the front and back.

9. Add tops

The final strengthening trick is adding to table tops. First add the larger, lower top. This should overhang the front and left hand side by 1", over-hanging the back by 1/2". To attach this top, glue and nail - or screw - down into the frame.

Add the smaller top to the higher part of the table next. Again, the overhang should be 1" to the front and both sides.

10. Add edging strip and molding to top

Add the edging strip to front and sides of both tops. Use glue and small finishing nails to hold the strip into place against the plywood edge of the table top. Next, add the small molding to the meeting point between the top and the main frame, thus making the two look more like one unit.

11. Make base panel and attach to base.

To finish off the main unit we need to add a base board that will serve as feet. This is one solid plank that runs the entire length of the unit. Route a curve out of the top side to round it off (see diagram). Add to from and sides - using a mitered cut at each end - using screws and glue. The board should overlap 1" with the frame, providing adequate bonding space.

12. Make drawers

Take the two side pieces, the back and the inner front piece. Cut a groove in each one that is 1/4" from the bottom of each piece and is 1/4" wide. This groove will allow the base to slot into the drawer frame. Once you have cut the groove, glue and screw the sides to the back piece, slot the base into the groove and then glue and crew the inner front board. Make sure that the unit is square. The result is a box without a lid.

Attach a 16" drawer runner mechanism to each side of the drawer, and to the corresponding "hole" in the main unit of the chest. Ensure that all drawer mechanisms are attached at the same height, so that the drawers are interchangeable in the unit. To attach the runners to the main frame, you may need to add a strip of wood to the rear verticals.

Finally, you need to add the front of the drawer to the box unit. However, before doing this, you need to shape the front of the drawer. The edge of this should be rounded using the same router bit as you used for the edging around the bottom of the main unit. Once you have routed all four sides of the drawer front, attach it to the drawer unit by gluing and screwing from the inside of the drawer outwards.

13. Finishing

Finally, nail the two back panel pieces on to the back of the unit and sand the entire unit thoroughly and paint.

BARRISTER BOOKCASES

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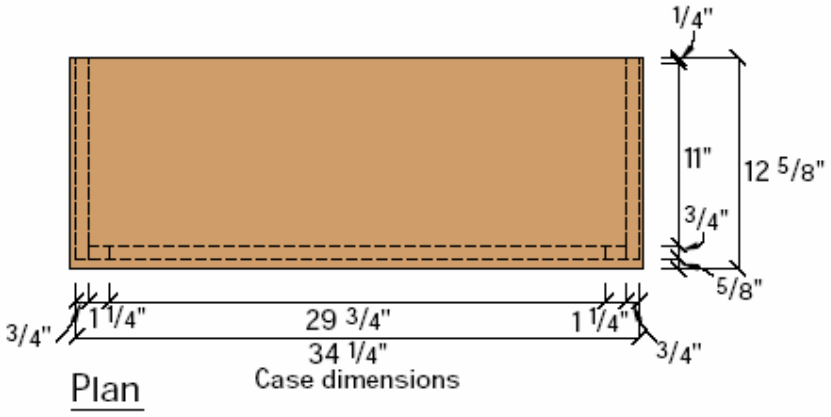
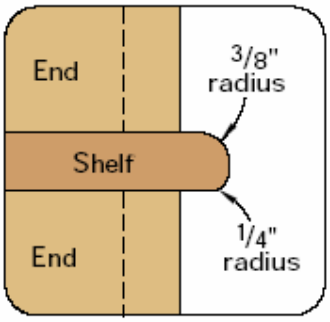
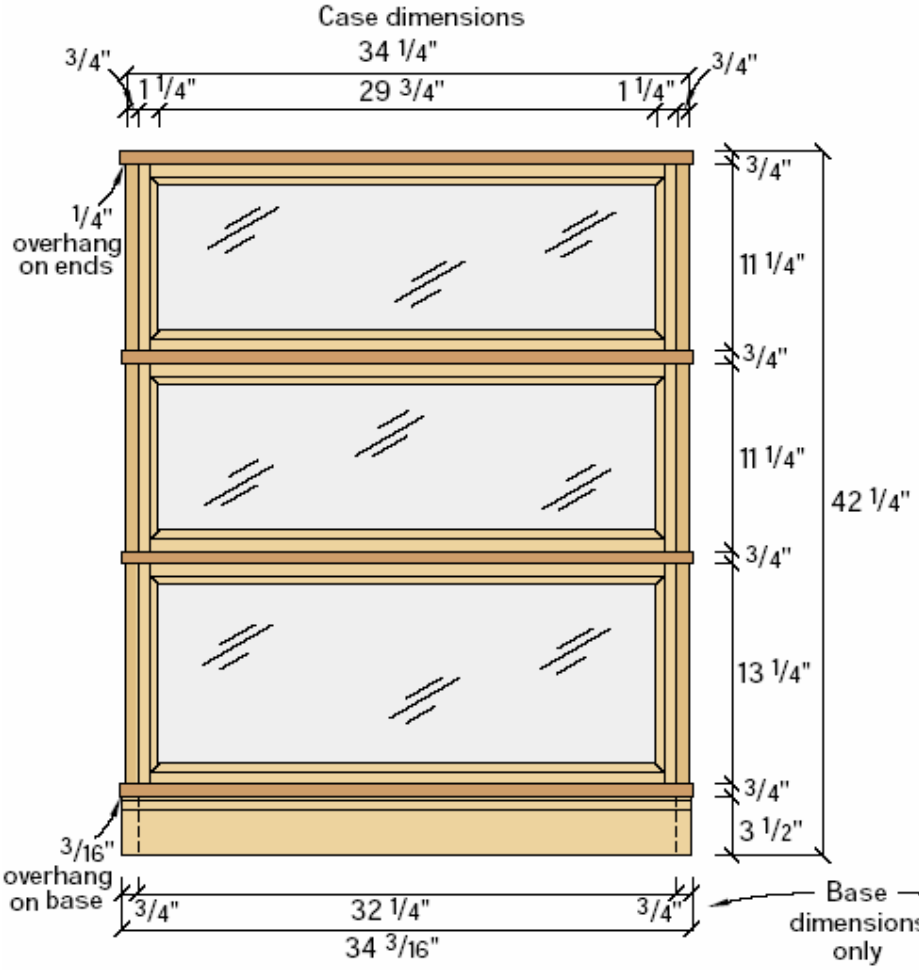


Plan

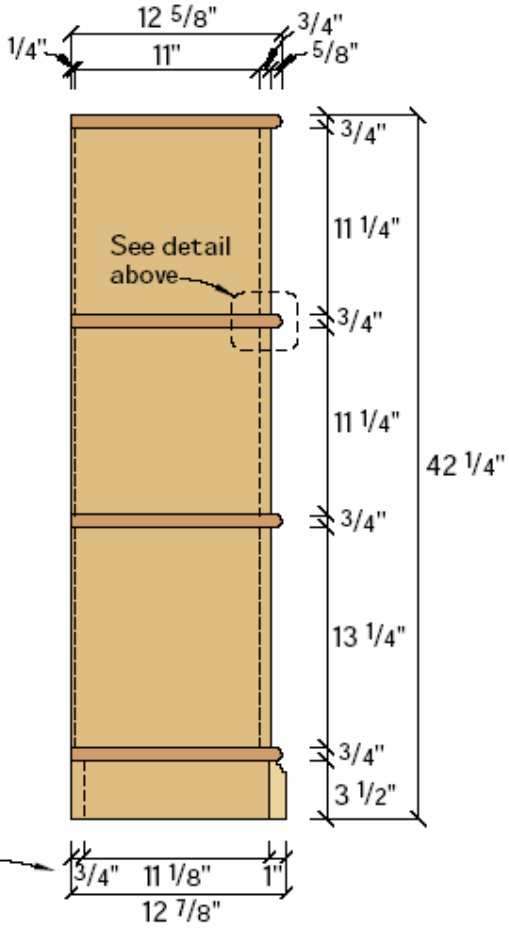


Detail of shelf edge radius



Elevation

Base dimensions only



Profile

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Not too far from our workshop here in Cincinnati, Globe Furniture made thousands of these so-called "barristers bookcases" for lawyers and bureaucrats across the nation. Many were made of oak, but the company also made them from other species of wood and even made a steel version.

Though this style of bookcase was first used exclusively by attorneys and government-types, the stackable units are now extremely popular (and pricey) in antique stores. And no wonder. You can use them to store just about anything anywhere. While most people use them for books or their favorite collectibles, I know one person who uses them in her bathroom to keep her toiletries.

I designed these bookcases so you can make any number of units that can be stacked on one another and stacked side-by-side as well. And there's a complete economy of material use because the top of one also serves as bottom of the case above it. In constructing the three cases shown, I used two different heights for the boxes. The shorter one accommodates books that are 9" tall or less; the larger case accepts books up to 13" tall.

Other than the extra time and the expense of more material, it makes a lot of sense to make several boxes because the set-ups to build the boxes are perfect for the "short production run" approach to building. That means setting up the machine -- in this case a router in a table and a drill press -- then running the parts. Because it can take longer to accurately set up the machine than run a part or two, running a few more parts makes real sense. Remember that accuracy is the key to the project because each unit has to be able to mate with all the other units.

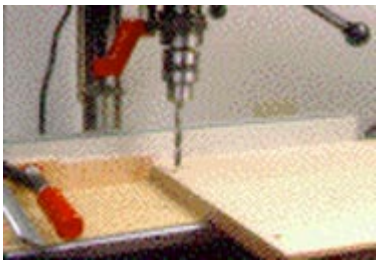
After you've determined the quantity and size of the cases you want to build, prepare enough wood to glue into the panels you need. Glue up your panels, then sand the joints flush, making sure to keep all the panels the same thickness. Cut the panels to the finished sizes indicated in the Schedule of Materials.

Mill the Cases • The joinery for the cases is straightforward. The plywood back is captured in a rabbet made on the sides and bottom (although the bottom rabbet is stopped 1/2" from both ends so you can't see it from the outside). Then the bottom is biscuited to the sides. The cases stack on one another using dowels in the tops of each case and holes on the bottom. Begin construction by chucking a straight bit in a router mounted to a table and make the 1/2" x 1/2" rabbets in the sides and bottoms.

Now it's time to do some additional routing to make the mechanism for the door slides and some hole drilling. While you can purchase special slides for barrister bookcases, my homemade method is cheaper, works just as well and is almost as easy as installing slides. Each of these steps requires real accuracy, and you must pay attention to which parts are for the right and left sides, fronts and backs, tops and bottoms. The best way to keep this straight is to organize your parts by kind, then stack them so they are oriented the way you want them. Marking them with a pencil adds another measure of insurance.

Begin by routing the stopped dado in the case sides that makes up part of the sliding door mechanism (the other part of the mechanism

DOOR SLIDE • With a 1/2" straight bit set in a router and mounted in a router table, set the height of the cutter to make a 3/8" deep cut. Now set up a fence on the router table to so that the cut starts 5/8" from the edge (see diagram detail). Now set a stop on the fence so that the cut you make stops 3/8" from the front edge of the sides. (Remember that you will have to change the stop when switching from right to left sides.) Because the peg used is 1/2" thick, you'll need to create a very slight amount of clearance, say 1/32", so that the peg moves easily through the dado. Do this by adjusting the fence away from the cutter. Then rerun the parts.



THESE HOLES HOLD IT TOGETHER • If you want your cases to mate correctly, accuracy is key. Use stop blocks on your drill press when drilling the bottom and a doweling jig on the sides.

BISCUITS ARE A GOOD FIT • After cutting my slots for my biscuits, I assembled the cases. By the way, I used polyurethane glue. While not necessary, it does provide a stronger joint in this situation because of its ability to provide some glue strength to the end grain/cross grain joint where the sides join the bottom (see related story in this issue about polyurethane glues).

is simply a peg inserted into the edge of the door).

Now drill the holes in the case bottoms. These holes are used to receive the indexing pins that are inserted in the tops of the sides. This interlocking quality keeps the cases from sliding while stacked atop one another and holds the sides in position. Remember that the holes are drilled in the bottom piece and line up with each case's sides. Set up the drill press with a 3/8" diameter bit, using the fence and a stop block, and drill the holes as indicated in the diagram detail to a depth of 3/8". Bear in mind that the holes are a different distance from the front and back edge so the fence set-up must change accordingly.

Make Perfect Holes • Now drill the corresponding holes in the top edges of the sides, again to a depth of 3/8". These holes are for the dowel pins. Again, accuracy is key. I used a self-centering doweling jig for drilling these holes. Mark the drilling locations carefully, a combination square will provide a consistent marking gauge. Refer to the diagram detail for drilling locations.

Biscuit the Sides • Next cut the biscuit slots for joining the sides to the bottom. I used three biscuits in each side, a #20 size in the middle and back, and a #10 in the front. I used the #10 so the slot didn't interfere with the hole drilled in the bottom. The three biscuits provided a very sound joint. The last thing to do before final assembly is to run a roundover detail on the front edge of the bottom. To make my profile, I used a 1/2"-radius bit on the top edge and a 1/4"-radius bit on the bottom edge. Again, use the router table and fence for the cut, even if you have router bits with guide bearings on them. You can rely on the bearing for the first cut. But on the second cut the bearing would ride on the previously cut radius, which sweeps away from the edge.

Assemble and glue the sides to the bottoms. I set the case backs in place to help keep them square during the glue-up. Here's how I glued these up: Put glue on the mating parts and set them in place. Then set the back in and clamp across the back and sides. Next, while making sure the back edge of the side was flush to the back edge of the bottom, clamp the side and bottom from top to bottom. With all the clamps in place, check for square and adjust as needed. Do not attach the backs until after finishing the piece.

Next I made the base of the bookcases. Rout the ogee profile on the top edge of the front piece only before biscuiting and gluing the base together. The sides simply butt to the back side of the front piece, and the plywood back piece butts into the sides. The back piece is narrower than the sides and front to leave some space at the floor for any base moulding on your floors. So attach the back piece flush to the top of the base assembly. I also elected not to attach to base permanently to one of the cases. Instead I screwed indexing blocks to the case bottom that allow the lower case to nest into the base. This allows you to level the base when you install it and then simply stack the cases on top.

Frame and Panel Doors • The frames for the glass doors were the last chore to tackle before moving on to sanding and finishing. Because I wanted the relatively small doors to have a delicate appearance, I made my stiles and rails just 11/4" wide. For a strong corner joint and a pretty detail on the inside edge of the frame, I used a matched stile-and-rail router bit set normally used for frame-and-panel doors. The nice ogee detail I used echoed the detail on the

ROUTING THE DOORS • First run the ogee detail on the inside edges of both the stiles and rails. Set the height of the cutter so that it leaves just a slight bead on the face of the parts, say 1/32". After running the parts, switch to the "coping" cutter and cut the matching opposite detail on the ends of the rails only. Make sure you use a back up block, also called a coping block, to stabilize the narrow part while running it through the router bit.

base and complemented the rounded front edge of the case bottoms.

Again, make sure you cut your stiles and rails to the exact length needed using a stop block. This will help ensure you make a frame that's square. Because the router bits are intended to be used with fixed panels, and the glass needs to be removable, it's necessary to cut away part of the edge detail on the back, changing it from a groove to a rabbet. Using a table saw, it's a simple procedure for the rails because you can run the part all the way through. For the stiles, however, you need to make a stopped cut because the piece you leave at the ends is part of the "mortise" joint made by the matching router profiles. Mark the stiles from the ends where you want to stop the cut (it can vary slightly depending on the cutters you use), then mark the table saw's fence at the point where the blade projects above the table when it is set to the correct height for the cut you're making. While holding the part firmly to the fence, slowly lower it onto the blade with the motor running, then cut the part to the matching lines on both the part and the saw fence.

Now you can glue up the stile and rail assembly, making sure you check for square and adjust as needed. When dry, chisel out the corner of the back of the stile where the waste piece remained from the stop cut you just made. Lastly, cut and fit the strips that will hold the glass in place on the back side of the frames.

Critical Dowel • Check the fit of the doors. You should have a 1/16" gap on the sides and bottom and a 1/8" gap left for the top (this allows the door to pivot up without touching the piece above it). If the fit is good, drill a 1/2" hole in the door's edge that's 1/2" deep. Locate the hole in the center of the edge so that the hole centers 5/8" down from the top edge. Use your combination square as a marking gauge and a doweling jig for accurate drilling. Drill these holes on both edges of each door. Insert a 7/8" length of dowel or other 1/2" rod into the door edge. Place the doors in the grooves in the sides of the case (this is easily done with the top open). Bring the doors forward and gently lower them down into position.

The last bit of fussing with the doors is setting the pin below the groove where the doors slide in their grooves. Carefully positioning the pin provides not only the spot where the door rest when open, but also coaxes it into the proper location at the top when closed.

Next sand your parts with 120 and 150 grit paper using a random orbit sander. Also make sure no glue was left behind that would interfere with making a nice finish. For the final finish, I tried something I'd never done before. I added a slight amount of oil-base stain to boiled linseed oil. Linseed oil on cherry brings out the grain of the wood more than does a film finish like varnish, shellac or lacquer. The wee bit of color added (I used about a thimbleful of stain to 10 ounces of oil) gave the new cherry a bit of "maturity" that the new wood always lacks. I tend to think that new cherry without any color added looks anemic. But too much color causes cherry to blotch if you don't apply a wash coat first or use a stain controller.

If you choose to use an oil-only finish, apply a couple more coats of boiled linseed oil making sure you thoroughly wipe off all excess oil after applying. For my bookcases, I allowed the oil to dry for several days then sprayed the pieces with clear lacquer. Brushing on varnish, shellac or polyurethane will work as well. Finally, put your doors back

into the cases and screw the backs into the sides and bottom.

When it comes time to set up your barrister bookcases, their modular construction and variety of arrangements should prove a real asset. That is, unless you can't agree with your "significant other" just how they should go. In that case, you might just need a barrister to settle the bookcase dispute.

Schedule of Materials: Barrister Bookcases, tall unit

No.	Item	Dimensions	Material
1	Top or bottom	3/4" x 12 5/8" x 34 1/4"	Cherry
2	Sides	3/4" x 12" x 13 1/4"*	Cherry
1	Back	1/2" x 33 1/4" x 13 3/4"*	Cherry ply
2	Door rails	3/4" x 1 1/4" x 30 3/8"	Cherry
2	Door stiles	3/4" x 1 1/4" x 13 1/16"*	Cherry
1	Base front	1" x 3 1/2" x 34 3/16"	Cherry
2	Base sides	3/4" x 3 1/2" x 11 7/8"	Cherry
1	Base back	3/4" x 3" x 32 11/16"	Cherry
1	Glass	1/8" x 12 1/4" x 30 5/16"	
	Glass stops	3/8" x 7/16" x 8 ft.	Cherry

* Subtract 2" from these dimensions for a shorter unit.

BIRDHOUSE

ITEM #	QTY	DESCRIPTION
1	1	1" x 6" x 5'-0" LONG CEDAR FENCE BOARD
2	35	1-1/2" LONG FINISH NAILS
3	1	OUTDOOR WOOD GLUE
4	4"	3/8" DIAMETER ROUND WOOD DOWEL

NOTE: All parts to be made from 1"x6" (3/4" thick by 5-1/2" wide) cedar fence board. Therefore, all dimensions shown 5-1/2" will not require cutting. If a board other than 5-1/2" wide will require additional cuts.

STEP #1

Make (2) side wall panels as shown in Figure #1.

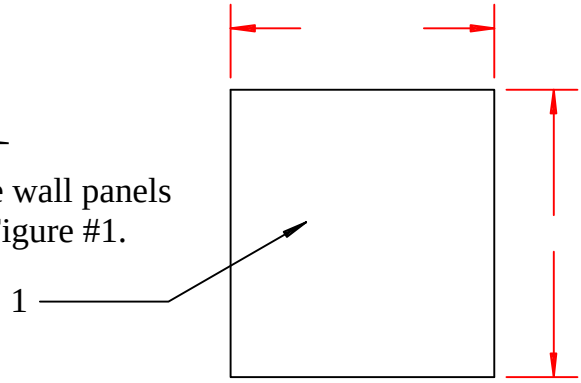


FIGURE #1

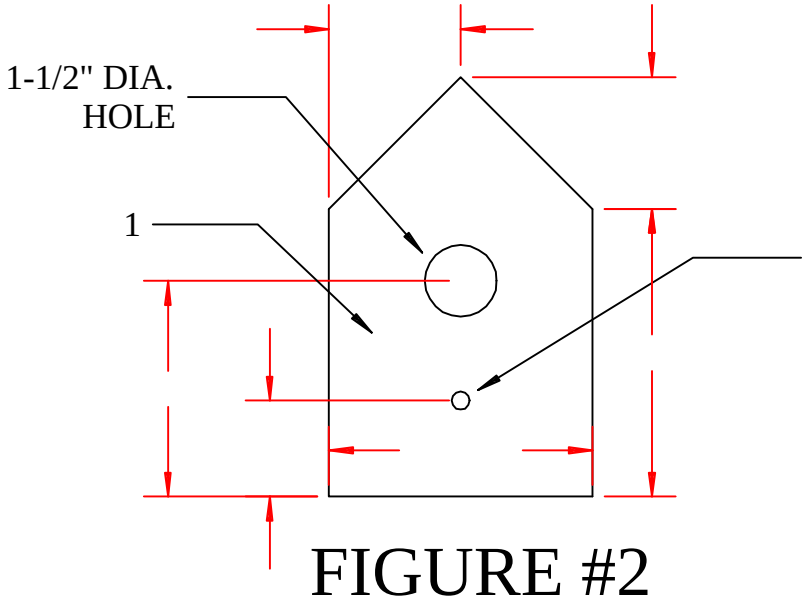


FIGURE #2

STEP #2

Make (1) front wall panel as shown in Figure #2.

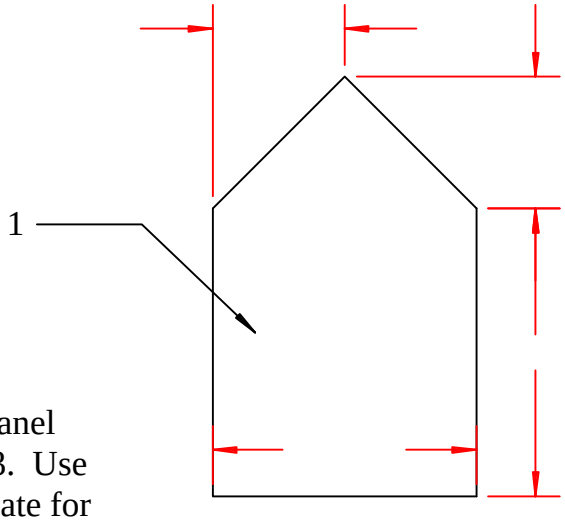


FIGURE #3

STEP #3

Make (1) back wall panel as shown in Figure #3. Use front panel as a template for back panel to ensure both panels are identical.

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STEP #4

Assemble (2) sides, front, and back panels as shown in Figure #4. Glue and nail (3 nails per joint) each joint.

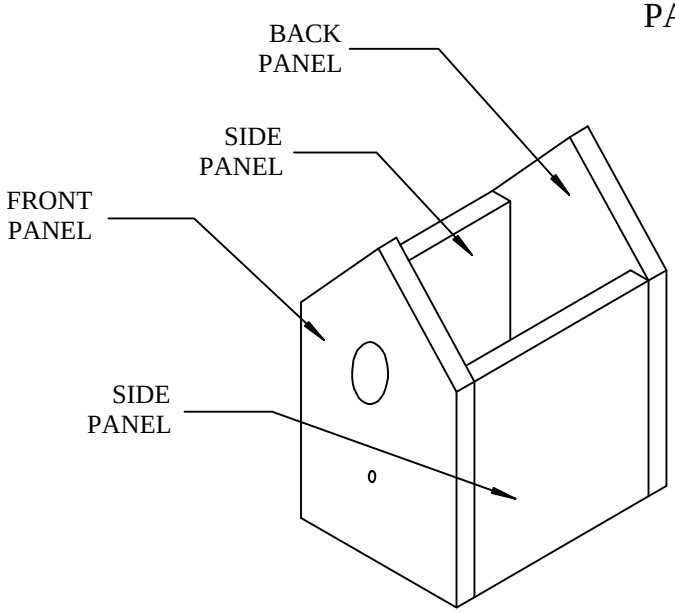

FIGURE #4

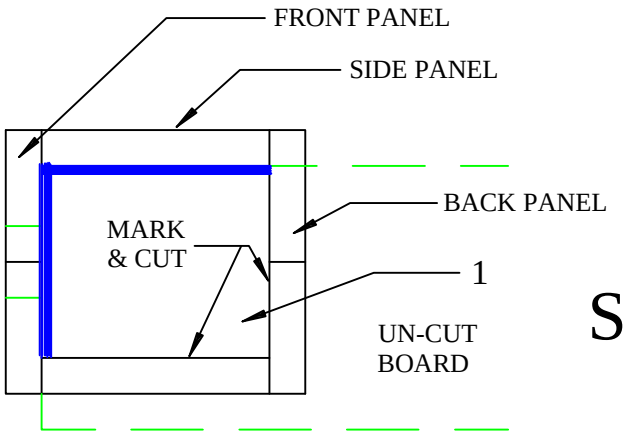

FIGURE #5
TOP VIEW

STEP #5

Make (1) bottom panel by placing assembled walls on top of oversized, future bottom panel, board as shown in Figure #5. Mark (2) edges to be cut from inside of birdhouse as shown in Figure #5. Cut on marked lines. Install bottom panel inside assembled walls with glue and nails (2 nails per side).

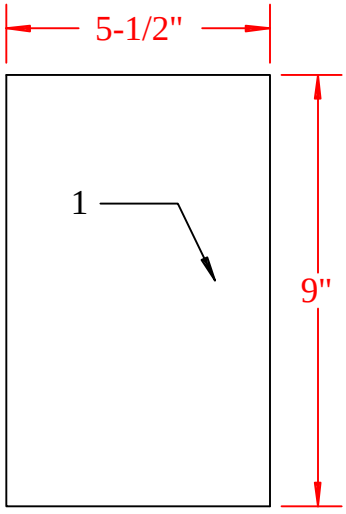

FIGURE #6a
RIGHT ROOF PANEL

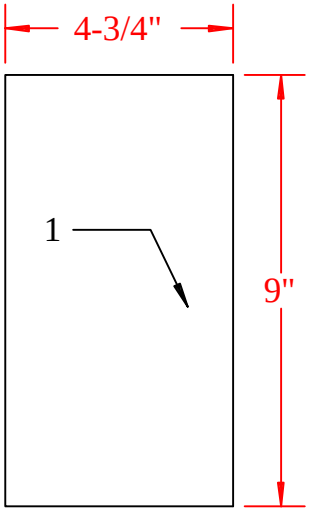

FIGURE #6b
LEFT ROOF PANEL

STEP #6

Make (1) right roof panel and (1) left roof panel as shown in Figure #6a and Figure #6b.

STEP #7

Install roof panels on house walls as shown in Figure #7a and Figure #7b. Glue and nail (2 nails per end and 3 nails along ridge) roof panels.

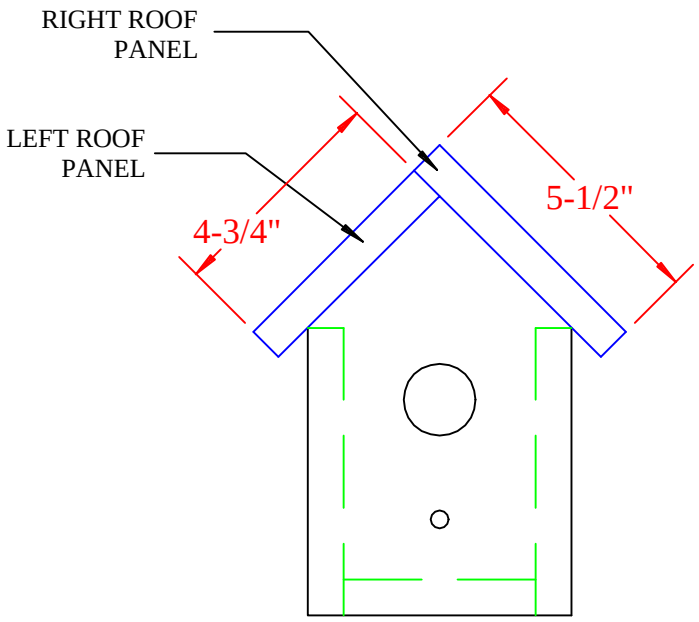

FIGURE #7a
FRONT VIEW

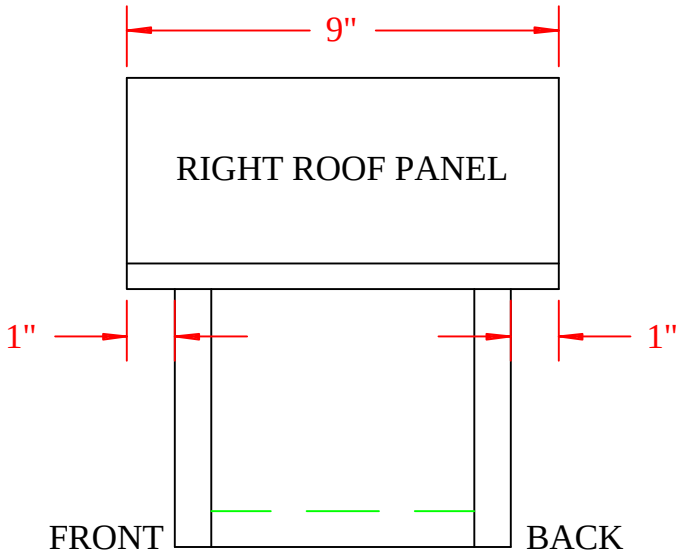

FIGURE #7b
SIDE VIEW

STEP #8

Cut a 4" long piece of 3/8" diameter wood dowel. Glue and insert dowel into 3/8" diameter hole previously cut into front panel of bird house.

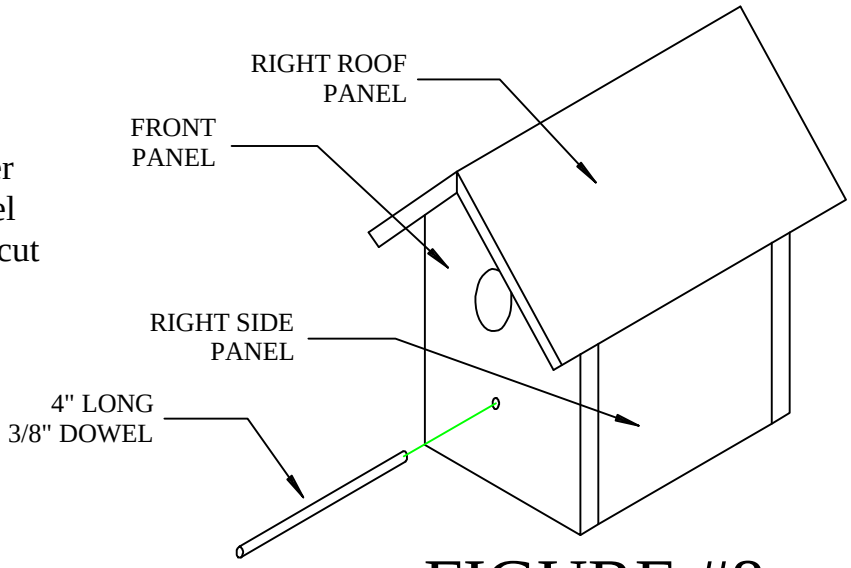

FIGURE #8

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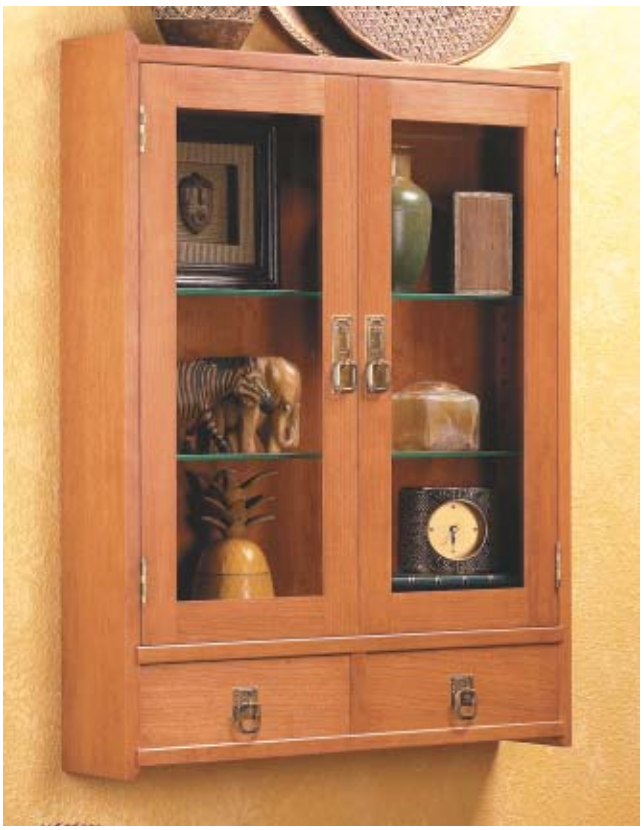


▲ *Though this case has some unique features, it's built with basic dado construction. For more on cutting dadoes and grooves, see our* ***Woodworking Basics*** *series at PlansNOW.com*

Case

The basic case of this display cabinet is quite simple — just a pair of sides that trap a top, bottom and a single, fixed shelf, as you can see in Fig. 1. Later, you'll add a vertical divider to create the drawer openings, a cleat for hanging the cabinet, and a plywood back. But for now, you can focus on the basic case pieces.

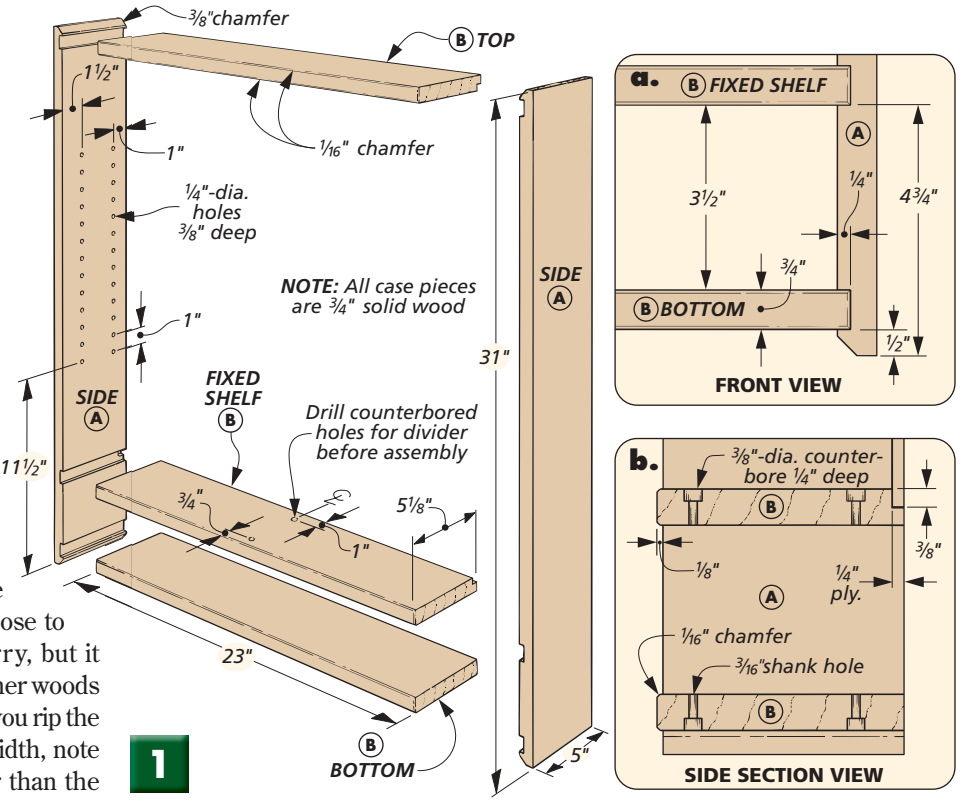
SIDES, TOP, BOTTOM & SHELF. The first thing to do is cut the *sides (A)* and the *top, bottom* and *shelf (B)* to size from ¾"-thick stock. (I chose to build this cabinet in cherry, but it would also look great in other woods like oak or maple.) Before you rip the top, bottom and shelf to width, note that they're slightly wider than the sides so they will stand ⅛" proud, as shown in the photo at left and Fig. 1b.

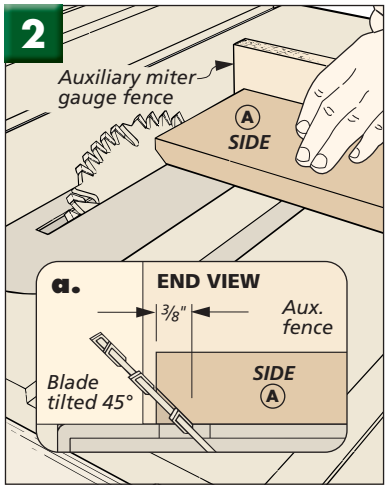
The sides require the most work, so I started with them. First, I cut a chamfer on both ends, as shown in Fig. 2. This is a fairly deep chamfer, so instead of cutting it in multiple passes with a router bit, I cut it on the table saw using an auxiliary miter gauge fence to support the piece.

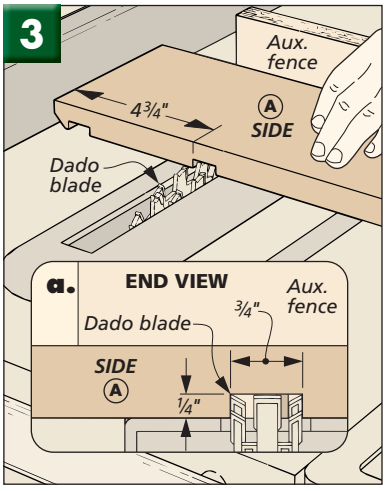
You can leave the auxiliary fence in place while you cut the dadoes to hold the top, bottom, and shelf, as shown in Figs. 1a and 3. And to make sure the dadoes line up across from each other, you'll want to either add a stop to the end of the auxiliary fence or use the rip fence as a stop, as I did in Fig. 3. (You can do this because the cuts don't go all the way through, so there are no waste pieces to kick back at you.)

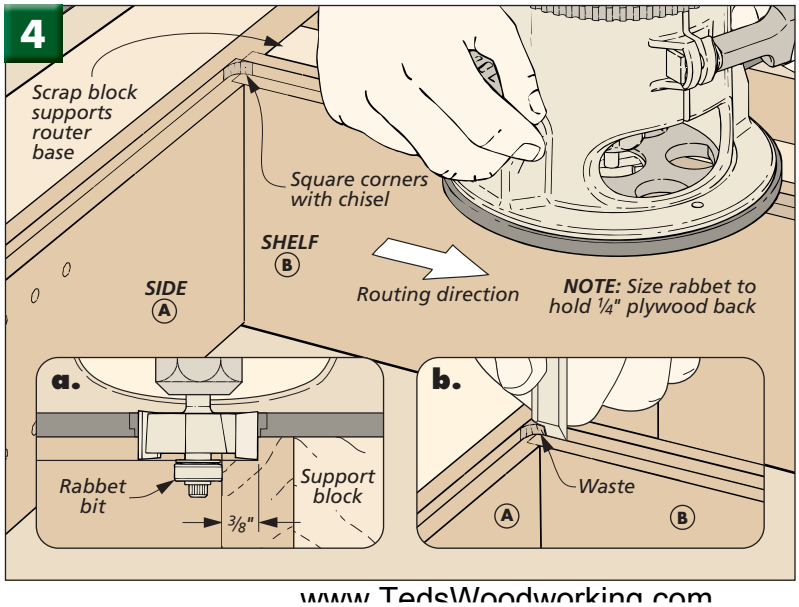
The last thing to do on the side pieces is drill the series of ⅜"-deep holes for the L-shaped shelf supports that will hold the glass shelves.

Before the case can be assembled, you'll need to do a little work on the top, bottom and shelf. First, the front edge of each needs a 1/16" chamfer, as indicated in Fig. 1b. Then in the shelf and bottom pieces, you'll want to drill the two counterbored shank holes that will hold the drawer divider.









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(It would be a bit awkward to do this after assembly.)

Gluing this case together isn't hard. Just remember the top, bottom and shelf stand proud in front of the case and are flush in back.

After the glue on the case is dry, the next thing to do is rout the rabbet for the ¼" plywood back panel. As you can see in Figs. 4 and 4a, I did this with a hand-held router, using scrap blocks to help support the router base so it wouldn't tip. Then I came back and cleaned up the corners with a chisel (Fig. 4b).

DRAWER DIVIDER. Before you cut the back to size, there are two other pieces to make. First I cut a *drawer divider (C)* to fit between the shelf and bottom, as shown in Fig. 5. But note that the front of the divider sets back ⅛", just like the sides (Fig. 5a).

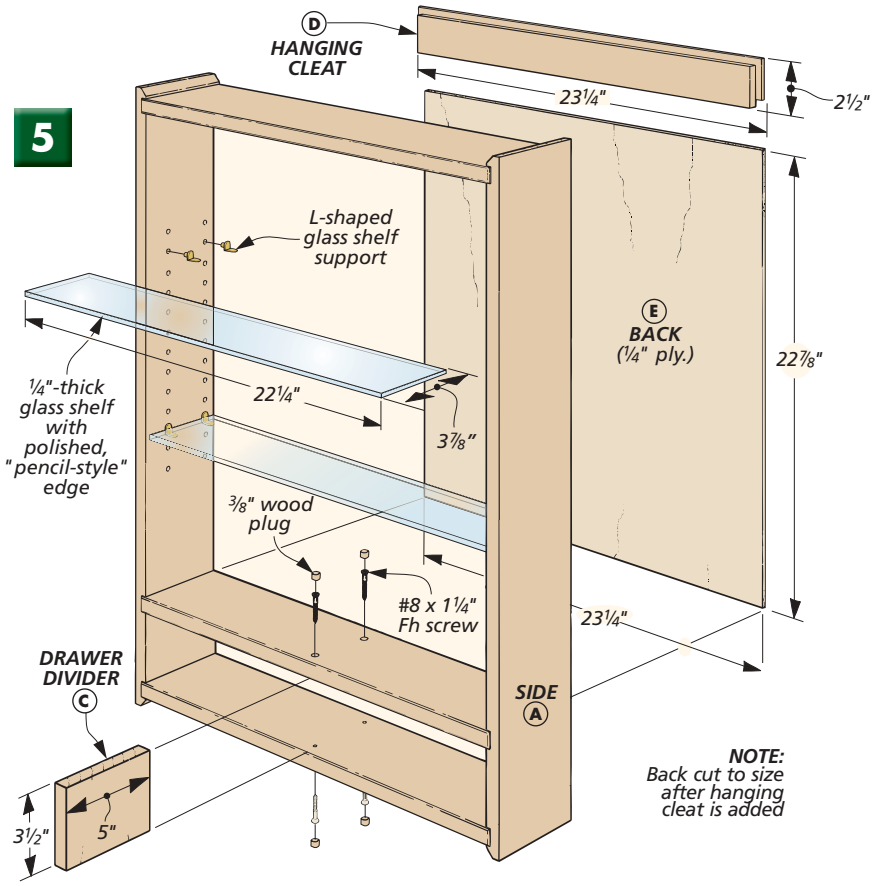
After screwing the divider in place (Fig. 5a), the screws can be covered with ⅜"-dia. wood plugs. (I'd recommend you use face grain plugs here so they'll be less noticeable.)

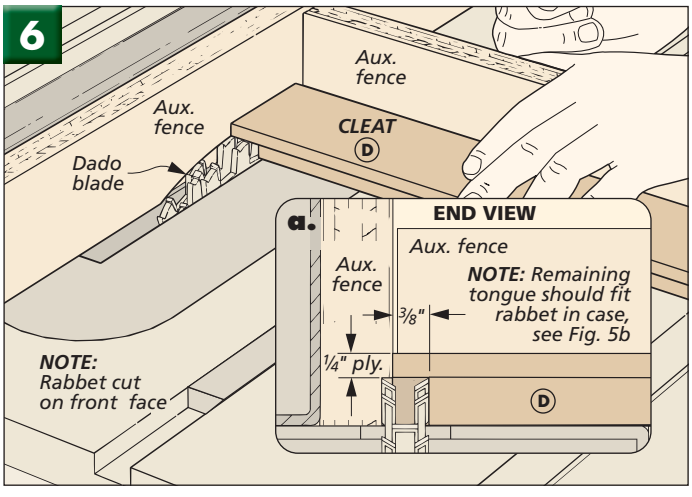
HANGING CLEAT. The next piece I added was a *hanging cleat (D)*, as you can see in Fig. 5. This way, when hanging the cabinet on the wall later, I had a ¾"-thick solid-wood piece to screw through, instead of the ¼" plywood back.

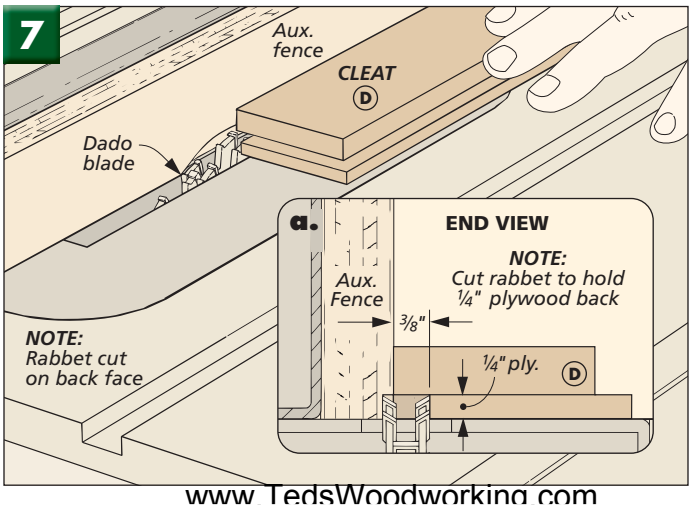
Making the cleat is a two-step process. It's cut to fit between the rabbets for the back, but to get it to fit flush with the back, you'll need to cut a rabbet around three edges of its front face, as shown in Figs. 5b and 6. The second step is just cutting another rabbet — this time, to match the rabbets in the case for the back, as you can see in Fig. 7.

BACK. When the cleat has been glued in place, you can cut the plywood *back (E)* to size and glue it into the rabbet (Fig. 5b).

GLASS SHELVES. You really don't need to order the glass for the shelves until you order the glass for the doors later. But I'll just mention here that I used ¼"-thick glass that had polished, "pencil-style" edges.







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Doors

At this point, the case is ready for the doors, and whether you build them with glass or wood panels, the procedure starts out the same. The door frames are built with a grooved bridle joint. But more on that in a minute.

CUT TO SIZE. Before cutting the *door stiles (F)* and *rails (G)* to size (Fig. 8), measure your case so the door pieces can be cut to fit its opening. The stiles are sized so there will be a 1/16" gap at the top and bottom of each door. The rails are a bit more work, but at least with a bridle joint, they're the full width of the door. Here, I allowed for a 1/16" gap on the sides of the case but no gap between the two doors. (Later, you'll trim the edges where the doors meet, as in Fig. 8b.)

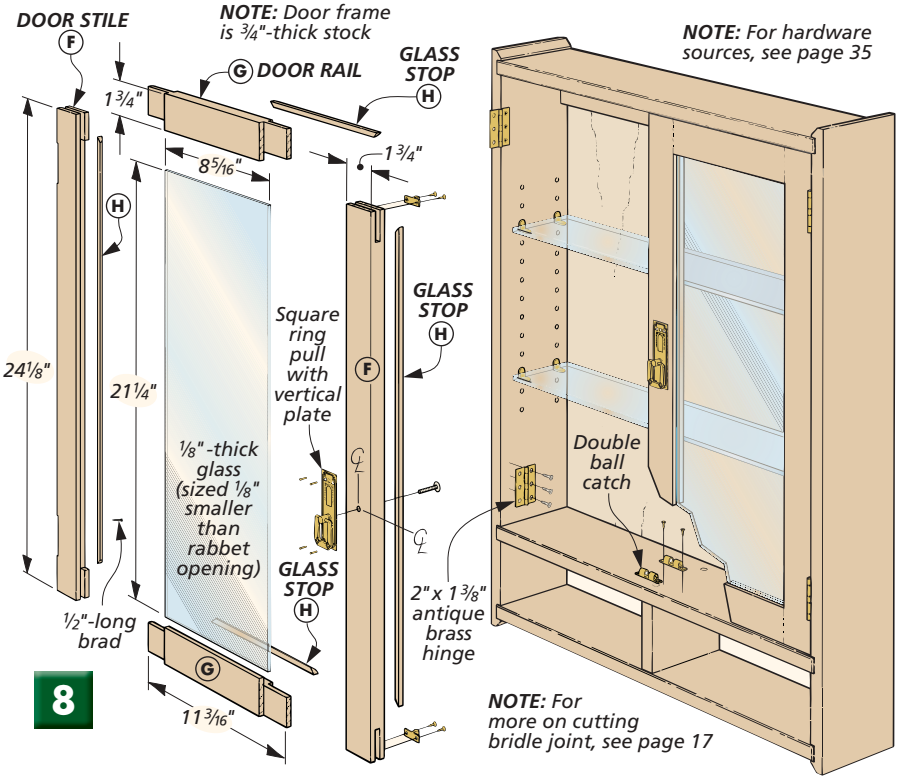
BRIDLE JOINT. With the pieces cut to size, you're ready to cut the bridle joint, see Fig. 8a. I came up with a quick jig (shown in the margin photo) that eliminates one of the setups. And I've described the jig (and how to cut the bridle joint) on page 8 and 9.

DOOR PANELS. If you're building the doors with wood panels, you'll need to make them *before* you glue up the frame, see bottom of page 6. For glass doors, you can glue up the frames now. (Later, you'll rout a rabbet for the glass to fit into.)

HINGE MORTISES. With the door frames glued up, I cut the mortises for the hinges next, as shown in Fig. 9. This can be done at the table saw, and I sized the mortises to match the full depth of the hinge barrel, minus 1/16" for the gap. (The hinges are simply screwed to the inside of the case.)

Now you can rout the back edges of the doors to hold the glass, as in Fig. 10. I used 1/4" *glass stop (H)* to mount the glass (Fig. 10b). And on page 8, there's a "miter box" I used to cut the stops to length. (But you don't want to add the glass until the finish has been applied to the project.)

HANG DOORS. At this point, the doors can be hung in the case. Then you can trim their inside edges to create the 1/16" gap (Fig. 8a) and add the pulls



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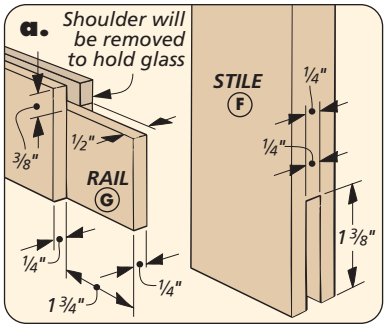

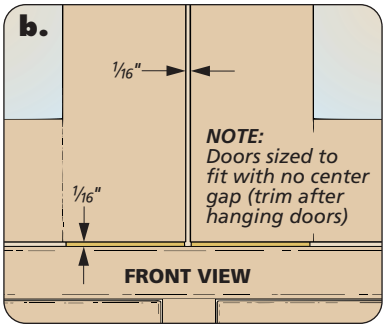

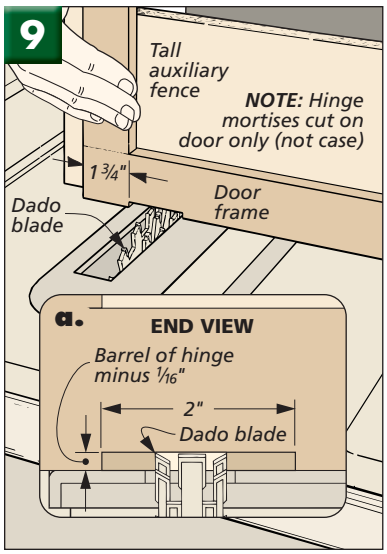

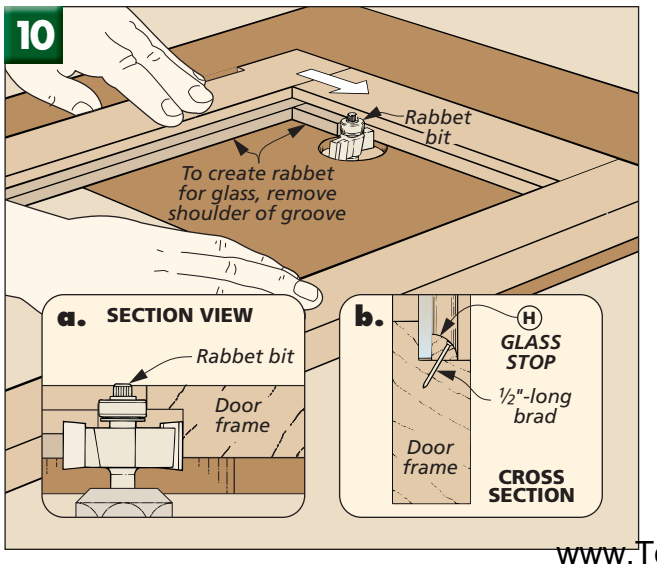

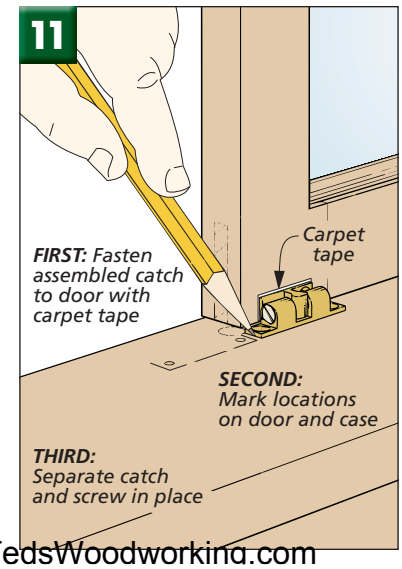

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and catches. The double ball catches I used can't be adjusted after they're screwed in place, so for an accurate installation, I positioned them with carpet tape, as described in Fig. 11.

DRAWERS

All that's left now is to build the two small drawers, as shown in Fig. 12. I sized the ½"-thick *fronts (I)* and *backs (I)* so the drawers would be 1/16" smaller than the openings in height and width. And the *sides (J)* are sized so the drawers would stop ¼" short of the back of the case.

LOCKING RABBET. To create a strong drawer without a lot of fuss, I decided to use a locking rabbet joint (Fig. 12a). It looks more complicated than it really is. In fact it can be cut in three quick steps on the table saw.

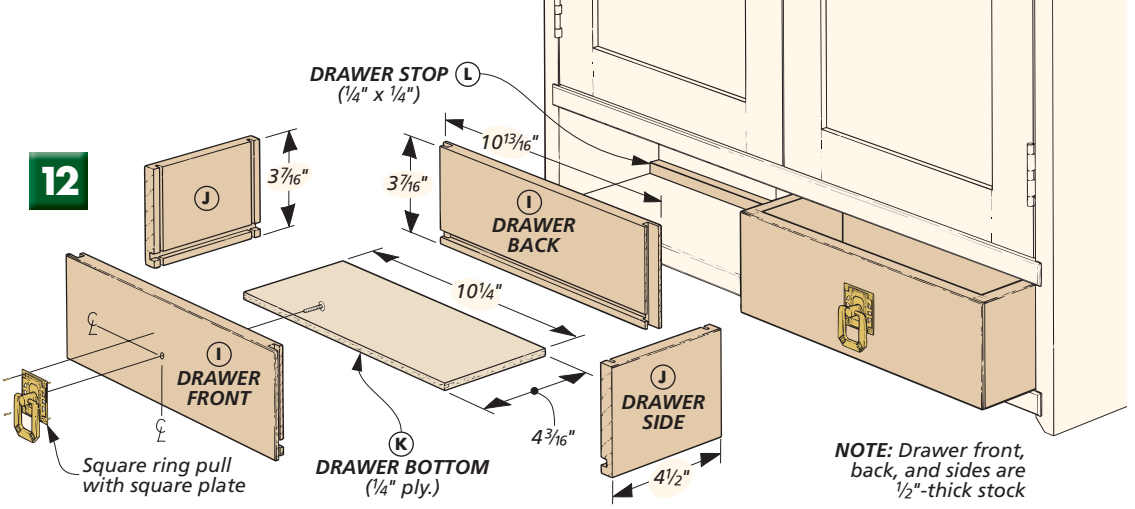
First, a centered groove is cut on the ends of the front and back pieces, as shown in Fig. 13. The key here is that the height of the blade matches the thickness of the drawer sides.

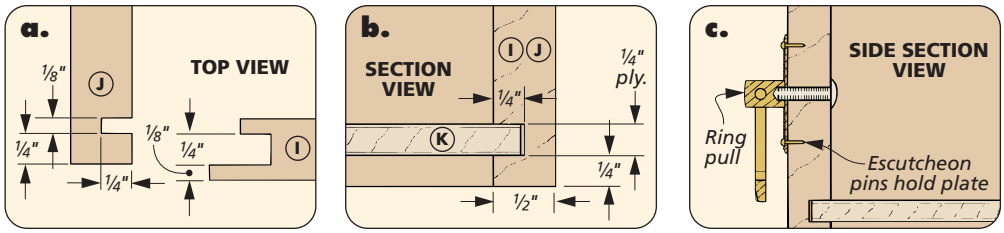
Next, I trimmed the inside face of the front and back pieces to create a ¼"-long tongue, as shown in Fig. 14.

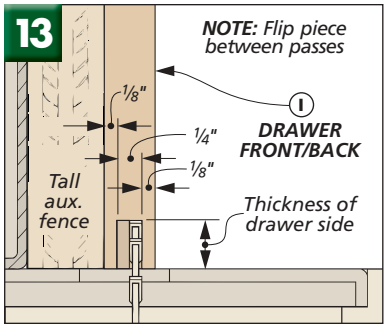
The last step is to cut dadoes on the sides (Fig. 15). Just position the dadoes to line up with the tongues cut in the fronts and backs (Fig. 12a).

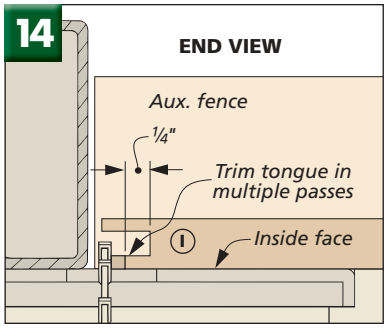
BOTTOM. Now each drawer piece is ready for a groove that will hold the ¼" plywood *bottom (K)*, as in Fig. 12b. Then when the bottoms are cut to size, you can glue the drawers together and add the pulls (Fig. 12c).

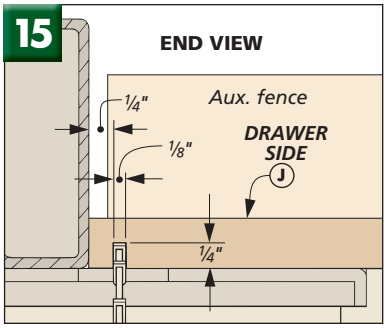
STOP. All that's left now is to cut two *stops (L)* for the back of the case. They're sized so the drawer will end up flush with the *sides* of the case. (Mine were ¼" wide.)







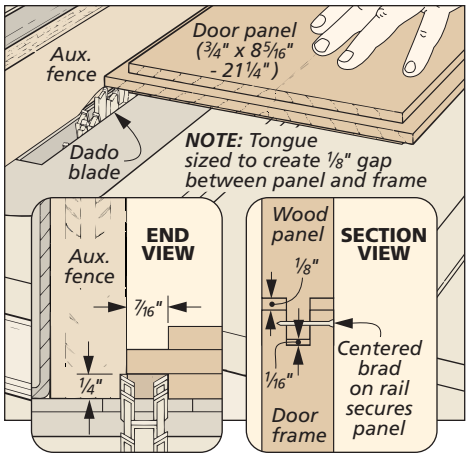




WOOD PANEL DOOR

For an elegant *storage* cabinet, you can build the doors with wood panels instead of glass. (You can also add wood shelves inside.)

Each panel is sized so it'll fit in the grooves when the door is glued together. (Be sure to allow a small gap on each side so the panel can expand and contract.) To create the tongue, all you need to do is rabbet each face, see drawing. And when assembling the frame and panel, remember *not* to glue the panel into the frame.



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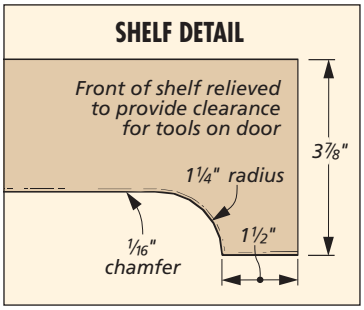
Storing Hand Tools

The display cabinet is sized just right to make a great tool cabinet for those special hand tools you want to keep accessible — and protected. Of course, whether you build a "fine" cabinet (with cherry and ash, like the one here) or choose less expensive wood is up to you. Either way, there are a few things to keep in mind as you're adapting this cabinet for tool storage.



WOOD PANELS. To make the best use of the space inside the cabinet, I decided to build the doors with solid-wood panels instead of glass. This way, I could store tools on the doors, as well as on the shelves (and back). But to do this, you have to make sure there will be enough clearance inside the cabinet. This means cutting shallow recesses in the front edges of the shelves or cutting narrower shelves (and changing the locations of the holes for the shelf pins), as in the drawing above.

ORGANIZING TOOLS. In order to get the most use out of the doors, I decided to spend a little time planning which tools would work best where. To do this, I simply laid the cabinet on its back with the doors propped open. This lets you shuffle the tools around easily until you have the most efficient layout. Then after you have chosen which tools will go where, you can begin making some custom tool holders.

TOOL HOLDERS. It's not hard to design and build your own custom tool holders. The goal is to get them to hang securely so they don't fall (or swing) whenever the door is opened. At the same time, you want them as easy to lift off and set back on as possible. Plus, if there are sharp edges, like the teeth on a hand saw or the point of an awl, you want to be sure that other tools (and your hands) are protected.

There are a number of ways to accomplish this, as you can see in the photos below. Simple kerfs are great for holding the blades of saws, squares, and rulers. For awls, chisels, and files, I drill counterbored holes that trap the handles and then cut slots for easy access. And for marking gauges and block planes, you can make a small shelf platform. Here, you'll want to add small cleats to the edges so the tools won't slide off as the door is opened and closed.

When you're making these small holders, it's best to do as much work as you can with the pieces oversized. This keeps your hands as far away from the blade as possible.

The photos below show just a few of the tool holder ideas we came up with for our cabinet. To see some more ideas, go to the Online Extras section on our web site:

***Scratch awl**. An open hole traps the handle of this awl. And to protect your hands (and other tools), the point sits in a base.*

***Hand saw**. A kerf can be used to protect the teeth of a hand saw. To support the saw, I added a simple base, see main photo.*

***Marking gauge**. For this marking gauge, a notched block supports the head, and a small lip keeps the tool from sliding off.*

***Combination square**. A small angled block with a shallow kerf is all you need to capture a combination square.*

Shop Notes

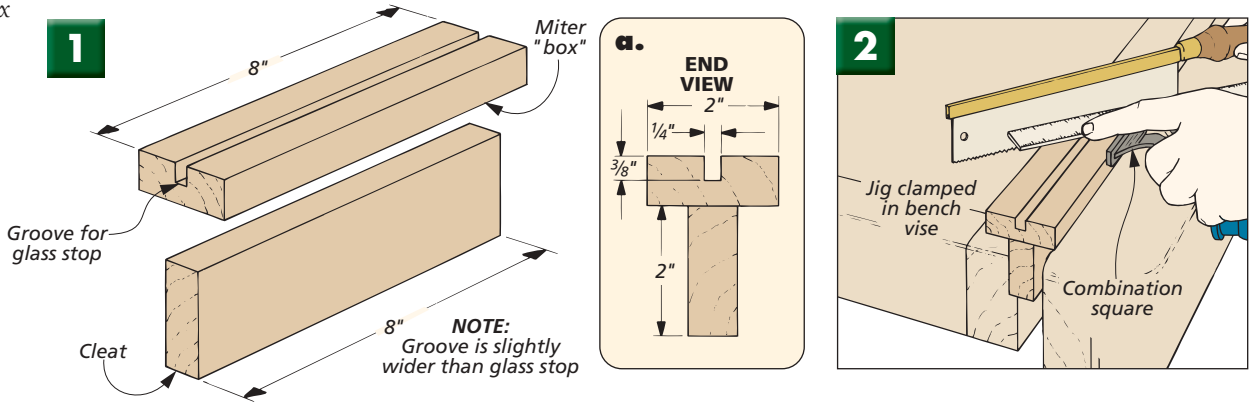
▲ *To allow my hand saw to slide smoothly in this miter "box," I applied a little wax to each face.*

Mitering Glass Stop

When mitering glass stop, the trick is to work with the fragile ¼" x ¼" strips safely. So when it was time to cut the stop for the glass doors on the display cabinet, I decided to leave my table saw turned off and miter the pieces with a hand saw, as shown in the photo at right.

MITER BOX JIG. To do this accurately, I made a quick miter "box" sized for small strips. As you can see in Fig. 1, this is just a piece with a groove cut in it to hold the glass stop blanks. (The stops shouldn't fit the groove tight, or you'll have a hard time adjusting them from side-to-side.) This miter "box" is glued to a cleat so the T-shaped jig can be clamped into a bench vise.

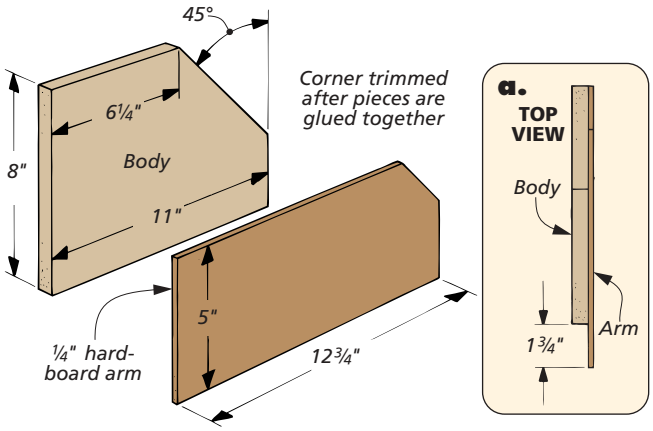
Of course the critical part of making this jig is accurately cutting the kerfs that guide the hand saw. And to do this, I used my combination square, as shown in Fig. 2. Then to hold the small strips in place, I gripped them with my fingers. But I found that the saw tended to bind in the kerf. So for a quick solution, I rubbed a little wax on the blade, as in the margin photo at left. W



▲ *This push block lets you cut the mortises without having to reset the fence.*

Make a Bridle Jig

I needed a simple push block to support the stiles while the mortises were being cut. Plus, I wanted to use the same fence setting as the groove setup so the mortises would align with the grooves. This push block does the trick. Its body matches the stile's thickness (¾"), and the hardboard arm extends past the front of the body to prevent the piece from tipping as it's pushed across the blade.



Bridle Joint

This display cabinet has door frames with grooves on their inside edges to hold a panel. As you can see in the upper photo at right, a bridle joint (or open mortise and tenon) is a good choice for this type of frame. It's plenty strong to hold a glass panel, and the whole process can be done on the table saw. All you need is the simple bridle jig (see page 8). Be sure to build the jig *before* you get started on the joint.

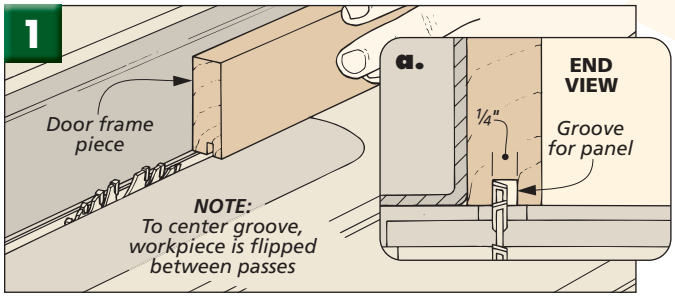
GROOVE. The first step to building the frames is to make a centered groove on each piece, as in Fig. 1. Technically, this isn't part of the joint, but you'll use this same fence setting to cut the mortise next.

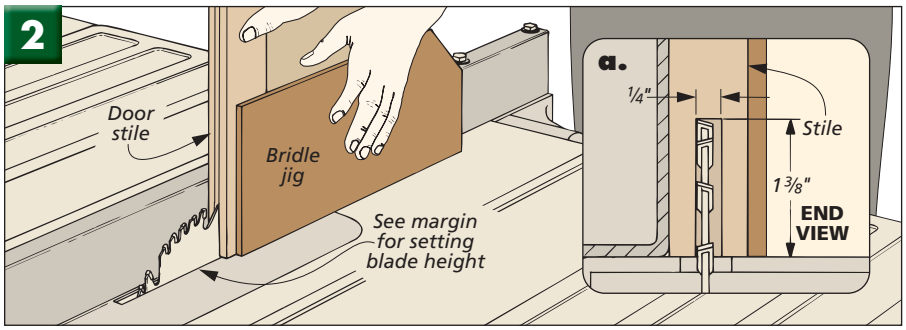
To cut the groove, I made a couple passes over a regular blade. Flipping the pieces between passes automatically centers the groove. And you'll want to sneak up on the position of the fence until the grooves are ¼" wide.

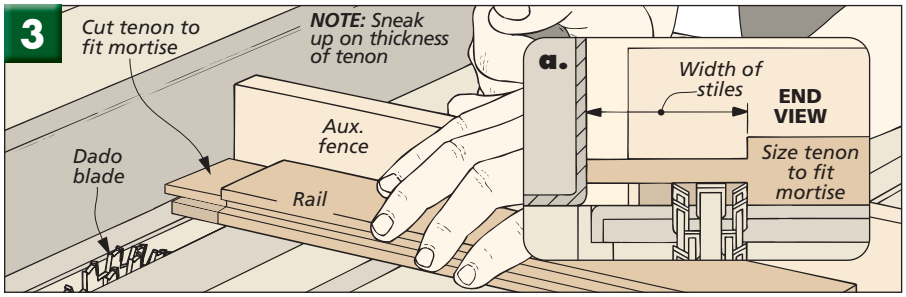
MORTISE. Now you can cut the mortises in the stile pieces, as in Fig. 2. You don't want to change the fence for this step. The mortises should align with the grooves. But you will need to raise the blade to set the depth of the mortises, as indicated in the lower margin photo. This way, the mortise's depth will automatically match the width of the tenon.

Cutting the mortises is the same two-step process you used when cutting the grooves. Only this time, the workpieces will be cut standing on end (supported by the jig).

TENON. All that's left now is to cut a tenon to fit the mortise. As you can see in Fig. 3, I laid the rails down for this step, making multiple passes over a dado blade. Set the fence so the tenon matches the width of the stiles. Then sneak up on the height of the blade until the tenon fits snug in the mortise.







▲ *Unlike a traditional mortise and tenon, a bridle joint can be cut completely on the table saw.*

▲ *To set the blade at the right height for the mortise of the bridle joint, raise it until it aligns with the groove in one of the rail pieces.*

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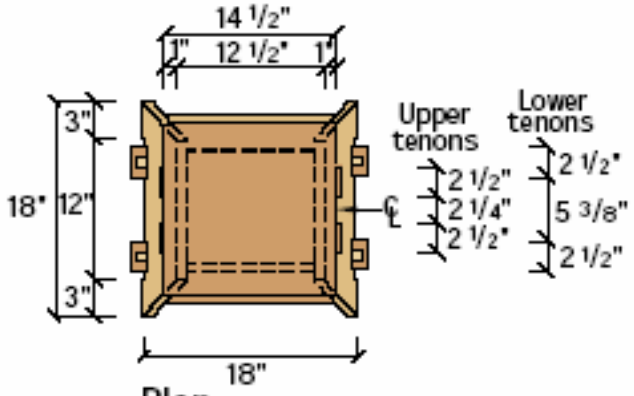
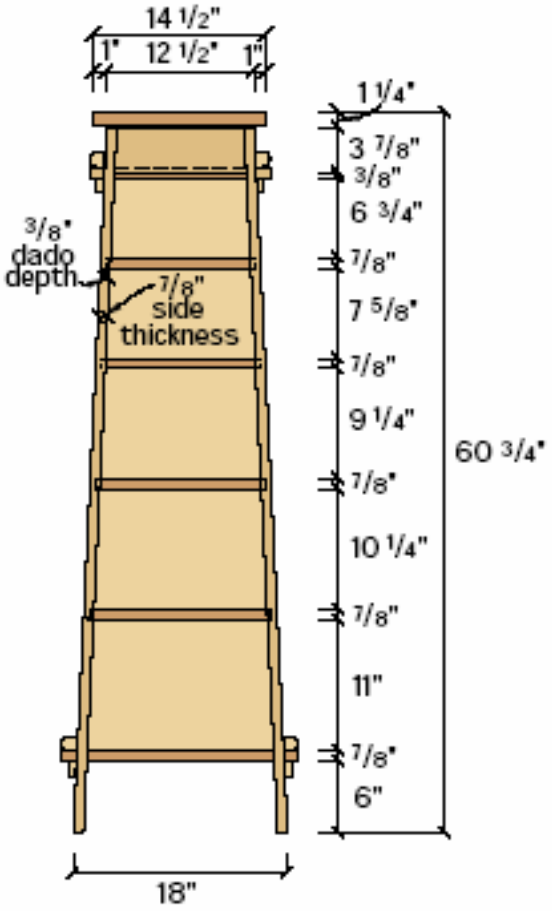
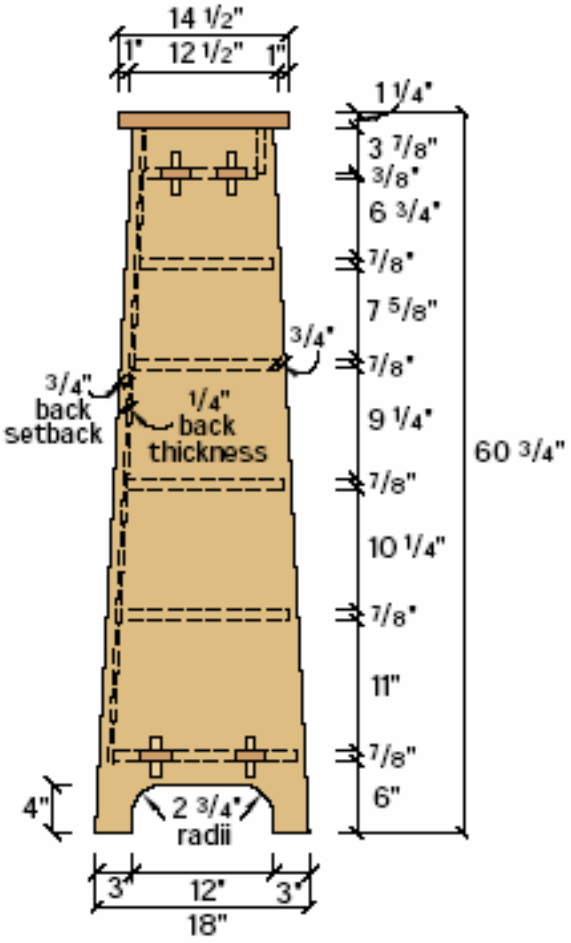
MANTLE CLOCK



Plan



Elevation



Profile

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During the Arts & Crafts heyday at the turn of the 20th century there were an extraordinary number of designs for bookcase and magazine stands offered to the public as completed pieces and construction plans. Most included simple designs and straightforward construction.

Slabs • In keeping with the Arts & Crafts style of stout furniture, the sides and shelves of this piece are called out as 7/8"-thick material. You may find the design more economically feasible by changing that to 3/4" material. Start by milling and matching the grain patterns on the two side pieces. If possible, try and use only two boards per side for the width. If this isn't possible, the trapezoidal design will allow you to use two 7"-wide boards for the center of each side, adding a 2" strip on the front and back edges of the lower half, keeping the exposed glue lines to a minimum.

With the sides glued, squared up and sanded flat, mark the location of the shelves as shown on the diagram. The top and bottom shelves will have angled through-mortises cut into the sides, while the other four shelves are captured between the sides in 3/8"-deep stopped dadoes. To mark the start and stop locations of the dadoes, draw the shape of the sides on the side blanks, then measure in 3/4" from the front and back edges.

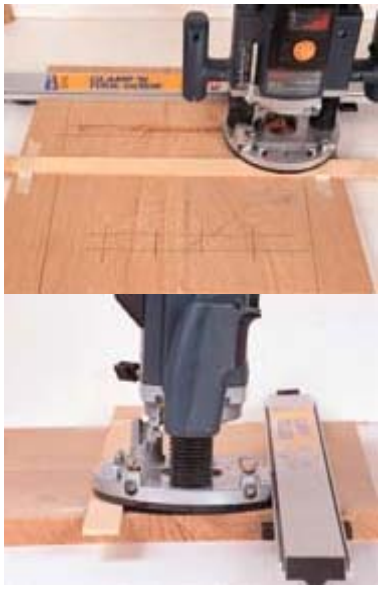
Cut the dadoes with a plunge router and a router guide. Even though the sides of the stand are angled 3 degrees, the dadoes can be cut at a 90-degree angle to the side leaving only a slight gap on the underside of each shelf. If you prefer to eliminate the gap, a wood strip can be used to tilt the router at a 3-degree angle. If you opt for the angled dadoes, run a test piece or you may inadvertently transfer your gap to the top of the shelf.

The through-mortises can also be cut using a router with the base tilted to a 3-degree angle or marked and hand cut. In either case, cut from the outside surface to keep any tearout to the inside of the case. Use a scrap backing board to reduce the tearout even further.

Trapezoids & Shelves • With the dadoes and through-mortises complete, crosscut the top and bottom edges of the sides at a 3-degree angle, then use a band saw or a jigsaw and a plane to shape the sides. Next, mark and cut the elongated half-oval at the base of each side to form the legs. Lastly, mark the back edge of each side for a 1/4" wide x 3/8" groove for the back. The groove should be set in 1/2" from the back edge and start 6" up on the sides, running through at the top.

Next cut the shelves to size. The four center shelves can be cut to the sizes given in the Schedule of Materials, with all four edges cut on a 3-degree angle. The top and bottom shelves are a little more complicated. Each must have the through-tenons cut to size and shape.
And the end of the shelf should be pared with a chisel on a 3-degree angle to match the inside surface of the sides. Don't cut the mortises for the wedges at this time. See the wedge diagram on the next page.

Back & Drawer • This next step can be a little awkward, so if you have a friend handy, give him or her a call. Dry-assemble the stand



MILL THE SIDES • A 1/4"-thick strip of wood is taped in place on the side slab to give a 3-degree angle to the shelf dadoes and the through mortises. Using a 1/2" straight router bit required moving the set-up once for each dado to achieve the 7/8" width necessary.

TAPERS EVERYWHERE • The sides are tapered only after all the necessary milling in the sides is completed. I used a jigsaw to cut the sides to size, then smoothed up the edges with a bench plane.

DRAWER • The drawer is made of 1/2" Baltic birch plywood, and it uses tongue-and-groove construction. A more complex joint could have been used, but the drawer is unlikely to see any heavy use and could be left out altogether.

by laying one side flat so the through-mortises hang over the edge of the table. Place the shelves in their respective dadoes and insert the through-tenons into the mortises. Then place the other side over the tenons and insert the shelves. To hold everything in place, use soft-jawed clamps across the width of the stand placed underneath the through-tenons. This should pull the tenons and the shelves into place. Check the fit and adjust as necessary.

With the stand still dry-assembled, measure for the trapezoidal back, allowing as tight a fit in the back grooves as possible. The bottom of the back will overlay the back edge of the bottom shelf and be tacked in place to the shelf. The top of the back should be flush to the top of the sides.

With the stand still dry-assembled, mark the location of the sides on the top and bottom surfaces of the shelf tenons extending through the sides. Then disassemble the stand and drill out or hand cut through-mortises through each tenon to accept the wedges. Note that the inside edge of the mortise should be 1/8" or so inside your marks to allow the wedges to draw the stand up tight. The diagram at right shows how the joint works. Cut the wedges a little oversized, reassemble the stand and fit the wedges in place. Make sure you mark the wedges so you'll be able to reassemble the piece easily.

If you hadn't noticed, this stand includes a little drawer just below the top. While not of a size to store a great many things, it's a good place for hiding an extra set of keys. The drawer itself is of simple box construction using tongue-and-groove joinery with a bottom captured in a groove. The angled sides of the stand serve as indexing runners to keep the drawer centered left-to-right. The drawer face is cut to match the shape of the sides and overlaps the top shelf, which serves as a drawer stop. Screw the face to the drawer box from the inside.

Topping Things Off • The top is a simple slab of wood that is attached to the sides by dowels. I carefully drilled dowel locations in the tops of the assembled sides, I then used dowel centers placed in the holes to locate the mating locations on the underside of the top piece. With the top fit, disassemble the stand again and sand all the pieces through 220 grit. As a finish for the piece I first applied a coat of brown mahogany gel stain. When the stain was dry, I applied a coat of clear lacquer, sanded and then applied a coat of warm, brown glaze. After the glaze had dried overnight, I added two more coats of lacquer. Assemble the stand as you did during the dry fit, tapping the wedges in place to hold the stand tightly together. If you plan on ever disassembling the piece, use a couple of screws to attach the back to the lower shelf and to the two center shelves for support. Then slip the top into place over the dowels. If you won't be disassembling the piece, use brads to attach the back and add some glue to the dowels to secure the top. PW

Schedule of Materials: Magazine Stand

No.	Item	Dimensions	Material
1	Top	1-1/4" x 14-1/2" x 14-1/2"	White Oak
2	Sides	7/8" x 18" x 59-1/2"	White Oak

1	Bottom Shelf	7/8" x 15-9/16" x 20"	White Oak
1	Shelf	7/8" x 14-5/16" x 15-7/16"	White Oak
1	Shelf	7/8" x 13-3/16" x 14-3/8"	White Oak
1	Shelf	7/8" x 12-1/8" x 13-7/16"	White Oak
1	Shelf	7/8" x 11-1/4" x 12-11/16"	White Oak
1	Top Shelf	7/8" x 9-1/2" x 15-5/16"	White Oak
8	Wedges	3/4" x 1-1/4" x 3-1/2"	White Oak
1	Back	1/4" x 16" x 53-1/2"	White Oak ply
1	False drw front	3/4" x 3-7/8" x 10-9/16"	White Oak
2	Drw sides	3/4" x 3" x 8"	Baltic birch
2	Drw ends	3/4" x 3" x 9-1/4"	Baltic birch
1	Drw bott	1/4" x 7-1/2" x 9-1/4"	Baltic birch

BREAD BOX

Bread Box

Bread boxes are very easy to make and it is almost a crime to consider buying one -- unless for some reason wood will not go in your kitchen. This particular bread box is based on one of the more common designs and is therefore easier to build than one with a roll-top lid. Bread box fanatics (presuming such a person exists) are split into two camps: those that want air holes and those that don't. We're not about to pin our colors to either side of the argument and, instead, offer a choice depending upon your own preference.

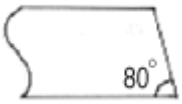
Construction

Tools required: Drill, sander, jigsaw, router

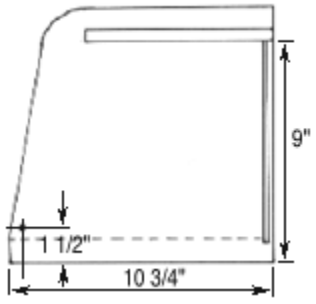
Wood required (pine):

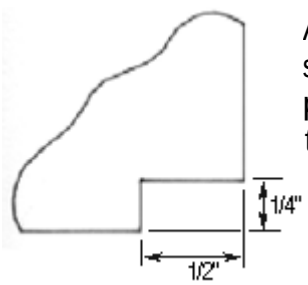
Description	Qty	Thickness	Width	Length
Base	1	3/4"	10 3/4"	18 5/8"
Sides	2	3/4"	10 1/2"	10 3/4"
Top**(see note)**	1	1/2"	8 9/16"	19 1/8"
Door	1	1/2"	8 1/8"	18 5/8"
Back (plywood)	1	1/8"	9 1/2"	19 1/8"
Hinge (dowel)	2	1/8"	1/8"	1 1/2"
Handle	1	3/4"	1"	5 1/2"

Note: When cutting the top to shape, the front length should be cut at a 80 degree angle. This is to ensure that the bread box door rests against the top evenly, rather than on a very thin edge (see diagram on left).



Cut the two side pieces to the correct shape (see diagram on right), rounding off the top with a smooth curve. Decide which face of each side piece is the inside face and mark it accordingly. Then cut the groove in each of these inside faces. The groove should be 1/2" wide, 1/4" deep and 8 1/16" long (measured from the back edge): it should be cut parallel to the bottom of the side piece at a height of 9" to 9 1/2" from the bottom. [The top of the bread box slots into this groove, thus strengthening the construction.] Finally, drill a 1/8" hole in either side piece, as shown in the diagram. This should be 1 1/2" from the bottom of the side piece, and in 1/4" from the front. The purpose of this hole is that the hinge dowel will pass through this, into each side of the door.





As mentioned above, the top piece slots into the side-wall groove. However, for the sake of neatness, you will notice that the side groove is not quite as long as the top piece is wide. Because of this, it is necessary to cut a small niche out of each end of the top piece (see diagram on left).

It is now necessary to make a groove in the top of the base piece, the inside of both sides and the underside of the top piece. This groove should be 1/8" wide, and 1/4" deep and should be 1/4" from the back of each piece. The back panel slots into this groove, ensuring a nice tight fit. When creating the groove for the two side pieces, do not extent the slot all the way to the top of the sides. Instead, only run the vertical 1/8" slot up to where it intersects the 1/2" horizontal groove.

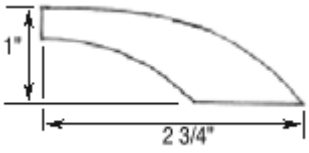
The final step prior to putting everything together is to prepare the bread box' door. Dry fit the sides, base and top and make sure that the door is the correct length to fit snugly between the sides. Then, round off the bottom length of the door, so that the side profile looks like a semi circle (see diagram).

Now, glue and nail (use small pin nails so that they won't show) the sides to the base. Then, glue in the back plywood and add the top, so completing the box shape. Clamp until the glue is dry. Once everything is dry, remove the clamps and place the door into place. Then, drill through the 1/8" holes in each side, into the side of the door. Put a little bit of glue onto each dowel, at least 1/2" from the end, and then slide the dowel hinges through the side pieces into the door. The idea is to glue the dowel into the side pieces, while leaving the door to rotate smoothly around the dowel hinge (it is a good idea to wax the very end of the dowel before gluing it).

Sand everything down, ensuring that the top of the door is flush with the top piece. Screw and glue the handle onto the front and then oil the bread box. To finish the bread box, we recommend mineral oil as it is a non-toxic oil.

Air Holes

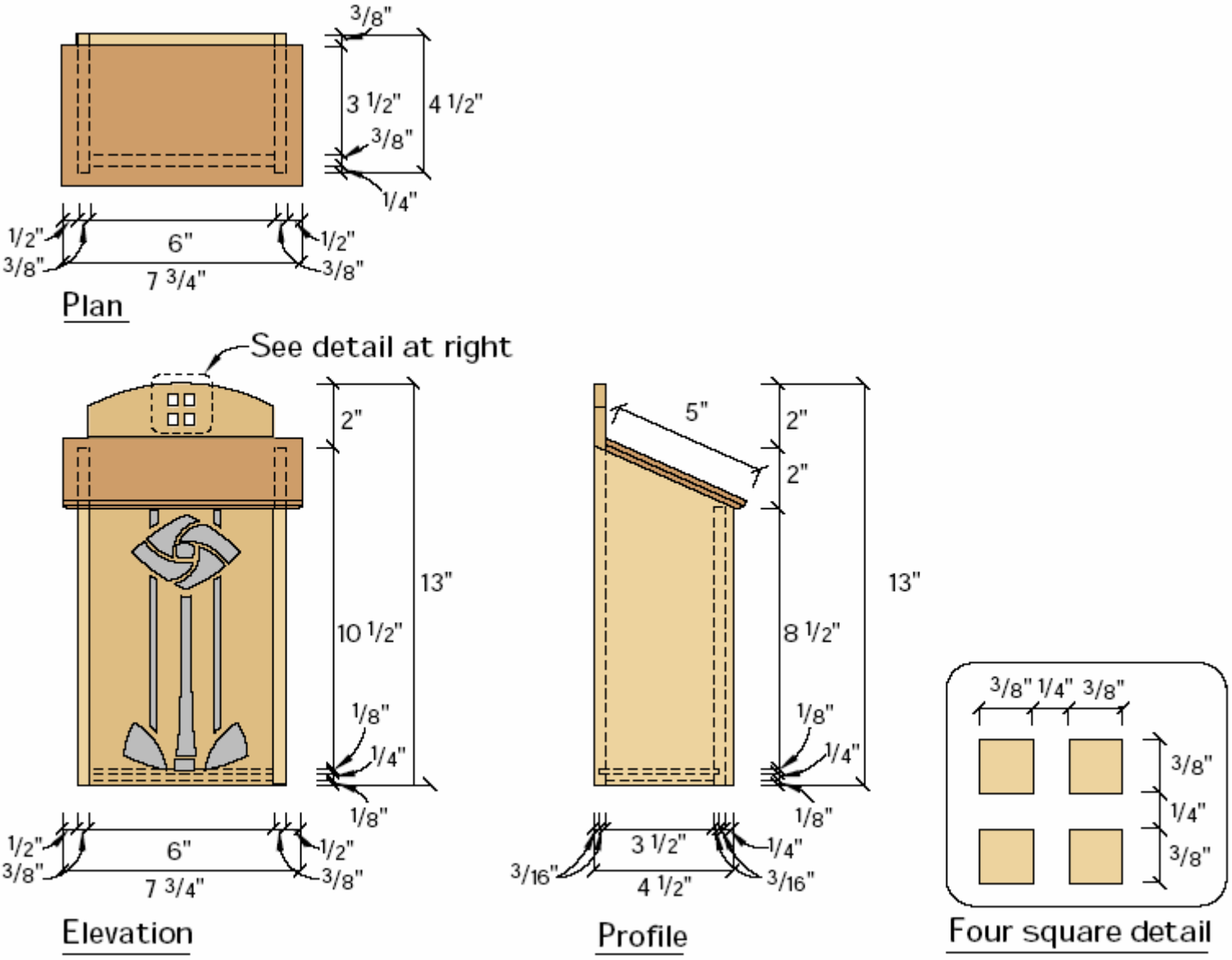
If you have decided to add air holes to the bread box, drill 1/8" holes into the upper part of the back plywood.



Handle

If you cannot find a satisfactory handle for the bread box, you may decide that you want to make one from scratch. If so, this is the plan for the handle used on the above box. Note that the thickness of the handle is 3/4". Also note that the plan provided is only half a plan. Simply sketch this out onto a block of wood, and then turn the plan over to sketch out the other side. This approach helps to ensure that the handle is uniform. Once you have cut out the shape, carefully sand it until you have a nice rounded shape.

BUNGALOW MAIILBOX

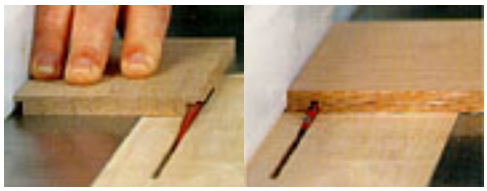


This project was by request. As I live in the 'burbs and have to walk to the curb to pick up my bills, a mailbox mounted next to my front door would be purely decorative. But a friend lucky enough to have postal delivery right to his door asked if I could come up with an appropriate design for his Arts & Crafts-style bungalow home.

After a little research I settled on a design reminiscent of the work of Charles Rennie Mackintosh. Arguably Scotland's greatest 20th century architect and designer, Mackintosh inspired much of the European Arts & Crafts movement during the early 1900s. A stylized flower motif is found on many of his pieces.

Mostly Glue • The joinery for the box is primarily glue and butt joints, utilizing the long grain-to-long grain orientation of the sides, back and front. The bottom, however sits in a tongue-and-groove joint between the front and back pieces to allow the wood to move.

After cutting the pieces according to the Schedule of Materials, cut a 1/4" x 1/8" rabbet on the underside of the two long edges of the bottom. This will leave a 1/8" x 1/8" tongue on the front and back of the bottom (photo one, left). Then cut the dadoes on the inside bottom of the front



1 BOTTOM JOINERY • The bottom fits into the front and back pieces using a tongue and groove method. The sides are not attached to the bottom, and in fact the bottom is cut to allow a 1/16" gap on either side. Should water happen to get into the mailbox, these gaps will allow it to escape rather than pool up in the bottom.

and back pieces by setting the rip fence for 1/2" and the blade height to 3/16" (photo one, right).

Adding the Angles • Now cut the sides of the mailbox on an angle so you can attach the mailbox to your house without cramming a tool inside the box. The sides slope at a 25-degree angle with the front edge measuring 9" tall and the back edge 11" tall.

Now cut the chamfer on the underside of the lid. The front and two sides are chamfered at a 45-degree angle on the table saw, leaving a 3/16" flat edge to the top of the lid. The back edge of the lid is cut at a 25-degree angle to mate with the box's back.

Detailing the Back • To add another Mackintosh feature, I cut a four-square pattern centered in the top of the curved back.

First mark the location of the four-square pattern as shown on the diagram. Use a 3/8" drill bit to remove most of the waste from the squares. Then use a chisel and a triangular file to clean up the cuts. To make the curve, draw a 6" radius along the top edge of the back and cut to the mark on the band saw.

After sanding, you're ready to glue up the box. The front is set back 1/4" on the sides, while the back is flush to the back edge. The bottom is left loose in the assembly.

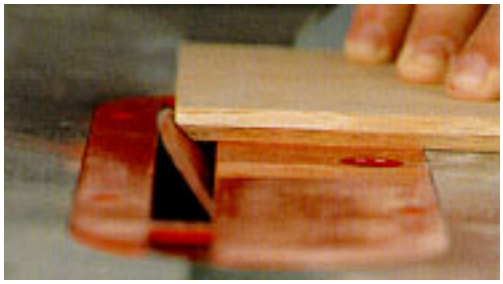
Now cut out the applied detail from 1/8" stock on the scroll saw.

Finishing Touches

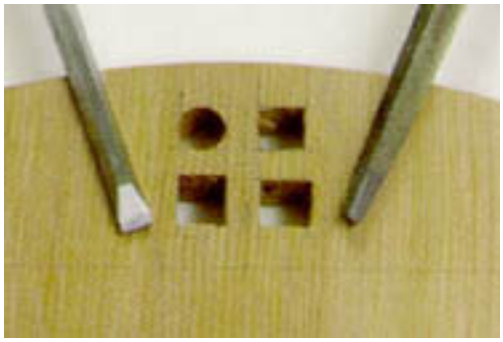
Before gluing the flower to the box, stain the box a rustic-looking gray-brown by applying a black aniline dye wash. The wash was made by diluting the dye eight-to-one with denatured alcohol. I then colored the flower and stem pieces with undiluted aniline dye. Attach the flower pieces using cyanoacrylate glue. To finish, use a coat of spar urethane for outdoor protection.

The final tasks are installing a small jewelry box continuous hinge for the lid and the copper magazine hooks. I made the hooks from a couple pieces of 3/4" copper tubing. Flatten the piece with a dead blow hammer, then use a ball-peen hammer to add a dimpled, hand-hammered appearance. I then "antiqued" the copper using a product called Patina Green from a company called Modern Options (415-252-5580). The product quickly adds a nice green patina.

Now screw the two hooks to the back, and the mailbox is ready to hang.



2 TOP CHAMFER • The top is chamfer cut on three edges, and angle cut on the back edge. By moving my rip fence to the left of the blade, my right-tilt saw is able to make the cuts safely, allowing the waste to fall away from the blade.

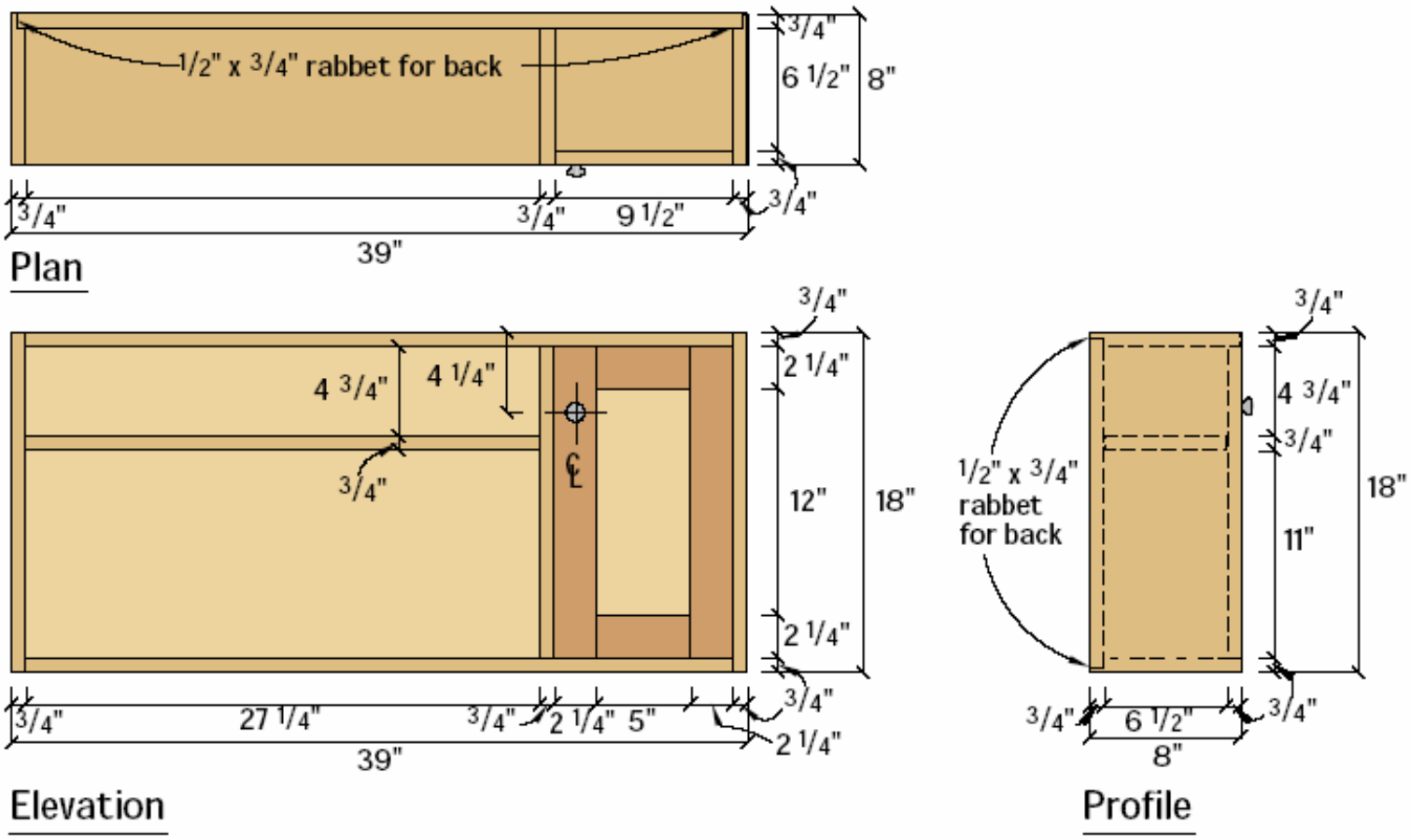


3 FOUR-SQUARE • After drilling the holes, use a 1/8" chisel and a triangular file to clean up the hole. The top left hole is shown after drilling, while the two lower holes have been completed.

Schedule of Materials: Bungalow Mailbox

No.	Item	Dimensions	Material
2	Sides	3/8" x 4 1/2" x 11	White Oak
1	Front	3/8" x 6" x 9"	White Oak
1	Back	3/8" x 6" x 13"	White Oak
1	Bottom	3/8" x 3 11/16" x 5 7/8"	White Oak
1	Top	3/8" x 5" x 7 3/4"	White Oak
1	Applied detail	1/8" x 6" x 9"	White Oak
2 12" lengths of 3/4" copper pipe			

BYRDCLIFFE CABINET



Assemble the Cabinet • Cut the pieces to size according to the Schedule of Materials. Pre-sand the cabinet parts, then assemble the frame with biscuits or dowels. Make sure the shelf and divider are flush to the front of the cabinet. Glue and clamp until dry.

Make the Door • Next rip the rails and stiles for the door, making a 1/4" wide by 5/8" deep groove in the center of one long edge of all four pieces to receive the panel. The groove also holds the tenons in the rails. Then cut 1/4" x 9/16" tenons on both ends of the door's rails using a dado stack. Cut a 1/4" x 1/2" rabbet on all four edges of the panel. Sand the parts, then assemble the door with the rabbet facing the back of the door. Glue and clamp.

Add the Back • Cut a 1/4" x 3/4" rabbet in the back of the cabinet with a rabbeting bit chucked in a router. Glue up the poplar for the back. When dry, nail the back into place. Be sure to allow some space for the back to expand. If you want to make the cabinet weigh less, use 1/2" poplar plywood for the back, but be sure to then cut the shelf and divider 1/4" wider. (Don't use less than 1/2" plywood if you plan to hang the cabinet by screwing through the back.)

Finish the Cabinet • Cut mortises for the hinges and hang the door before finishing. Finish sand the cabinet. The best way to stain the cabinet green is by spraying on aniline dye diluted with alcohol. I used an inexpensive Preval™ Power Unit aerosol can (it costs about $4 at craft and hardware stores). After you spray the dye on, wipe it down immediately with a rag moistened with denatured alcohol to minimize blotching.

Add the Flower • Cut the iris flower pattern from 1/4" poplar with a scroll saw or coping saw. Dye the pieces, then glue them to the panel with a "super" glue. Cover the cabinet with two coats of clear finish.

Schedule of Materials: Byrdcliffe Cabinet

No.	Item	Dimensions	Material
2	Sides	3/4" x 8" x 18	Poplar
2	Top & Bott.	3/4" x 8" x 37 1/2"	Poplar
1	Shelf	3/4" x 7 1/4" x 27 1/4"	Poplar
1	Divider	3/4" x 7 1/4" x 16 1/2"	Poplar
1	Back	3/4" x 17 1/8" x 38 1/8"	Poplar
2	Rails	3/4" x 2 1/4" x 6"	Poplar
2	Stiles	3/4" x 2 1/4" x 16 1/2"	Poplar
1	Panel	1/2" x 6" x 13"	Poplar
Approx. a 1/4" x 6" x 13" piece of poplar for the Iris pattern			

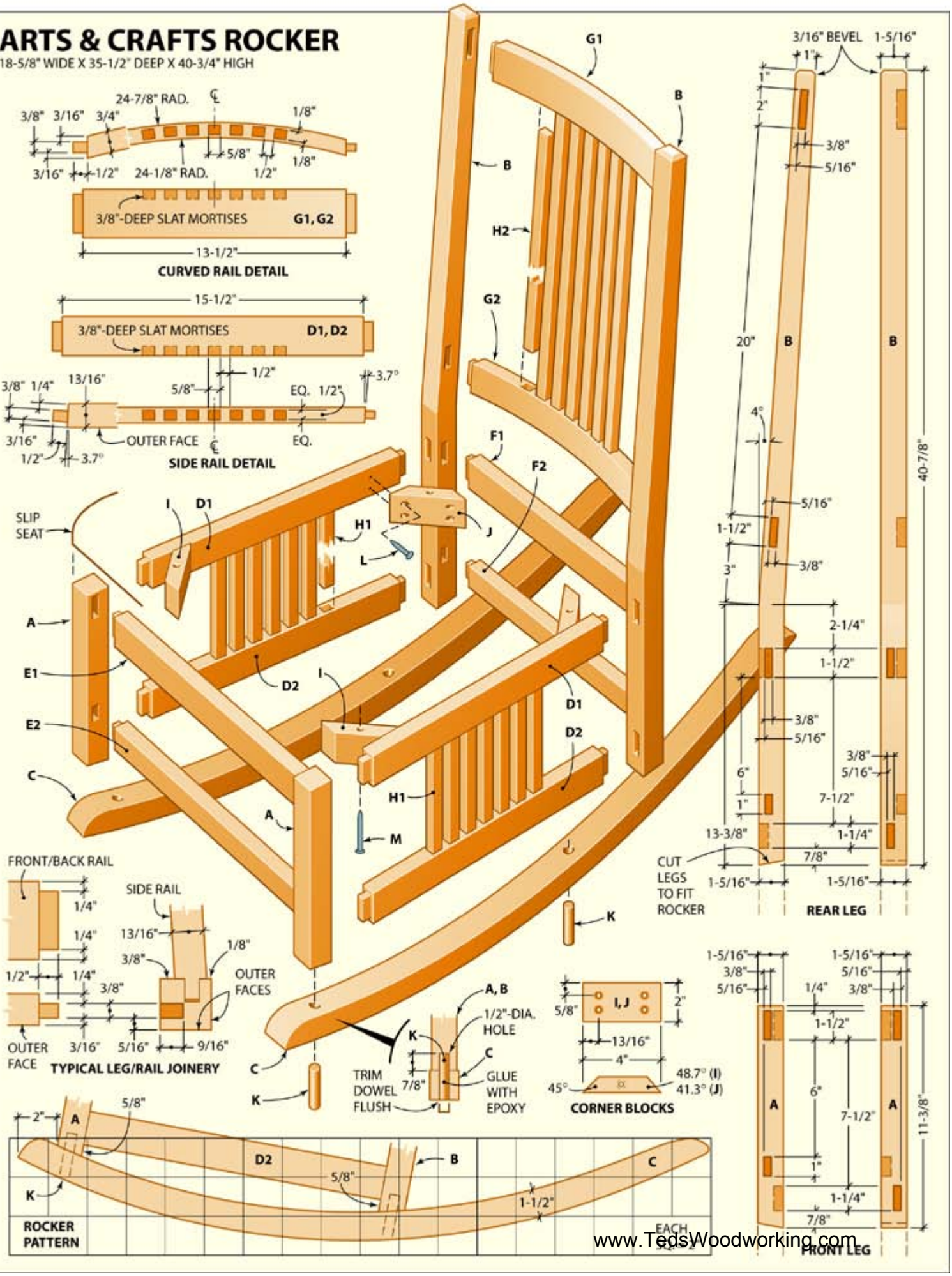
CLASSIC ROCKER

ARTS & CRAFTS ROCKER

18-5/8" WIDE X 35-1/2" DEEP X 40-3/4" HIGH

CURVED RAIL DETAIL

SIDE RAIL DETAIL



www.TedsWoodworking.com

Materials List--Rocker		
Key	**No.**	**Size and description (use)**
A*	2	1-5/16 x 1-5/16 x 11-3/8" oak (front leg)
B*	2	1-5/16 x 3 x 40-7/8" oak (rear leg)
C	2	1-1/2 x 5-1/2 x 35-1/2" oak (rocker)
D1	2	13/16 x 2 x 16-1/2" oak (side top rail)
D2	2	13/16 x 1-3/4 x 16-1/2" oak (side bottom rail)
E1	1	13/16 x 2 x 16-1/2" oak (front top rail)
E2	1	13/16 x 1-1/2 x 16-1/2" oak (front bottom rail)
F1	1	13/16 x 2 x 14-1/2" oak (rear top rail)
F2	1	13/16 x 1-1/2 x 14-1/2" oak (rear bottom rail)
G1	1	1-3/4 x 2-1/2 x 14-1/2" oak (back top rail)
G2	1	1-3/4 x 2 x 14-1/2" oak (back bottom rail)
H1	14	1/2 x 5/8 x 7-3/4" oak (side slat)
H2	7	1/2 x 5/8 x 20-1/4" oak (back slat)
I	2	13/16 x 2 x 4" oak (corner block)
J	2	13/16 x 2 x 4" oak (corner block)
K	4	1/2"-dia. x 3"-long dowel (rocker pin)
L	16	1-1/2" No. 8 fh woodscrew
M	4	2-1/2" No. 8 fh woodscrew
* Leave leg bottoms several inches longer to be trimmed when rockers are installed.		

Preparing The Pieces

Use a ripping guide and circular saw to bring your stock down to the required widths (Photo 1). To make the cuts safely and accurately, clamp the wide stock to some scrap blocks on your worktable and use two hands to control the saw. Rip the slat and rail blanks slightly oversize, and use a plane and sandpaper to smooth the sawn surfaces. Then use a speed square as a guide to crosscut the stock to size (Photo 2). When cutting the chair legs, leave the blanks several inches longer than specified. You'll trim the legs to finished size after assembling the frame.

Next, make a template for the rockers from a piece of 1/4-in.-thick plywood or hardboard. Trace the outline of the template onto the rocker stock. By nesting the two rockers on the blank, you'll minimize waste. Cut the rockers from the blank with a sabre saw (Photo 3), keeping the blade on the waste side of the line.

Clamp one of the rockers to the worktable and use a sharp spokeshave to smooth the inside curve (Photo 4). Turn the rocker over and use either a plane or the spokeshave to smooth the other side.

Make a template for the rear leg, trace the shape onto the

Use a circular saw and ripping guide to rip the stock. Clamp the work to your table so both hands control the saw.

leg blanks and cut out the legs with a sabre saw. Clamp two legs together, plane away the saw marks and bring them to final shape. On the back sides, you'll have to use a spokeshave and sandpaper in the area where the straight bottom portion of the leg meets the tapered top section.

Clamp a speed square to the chair rail stock, and use it to guide the saw and ensure accurate crosscuts.

After marking the rocker shapes with a template, use a sabre saw to cut to the waste side of the lines.

Use a spokeshave to smooth the inside surface. A spokeshave or plane will work on the other side.

Chair Joinery

Mark the locations of rail mortises in the chair legs, and use a plunge router with a spiral up-cutting bit and edge guide to cut the mortises (Photo 5). You could also bore a series of holes using a doweling jig to guide the drill. In either case, use a sharp chisel to finish the mortises.

Carefully lay out the tenons on the ends of the straight chair rails. Note that the side rails have angled tenons and tenon shoulders. Clamp a rail against the edge of the worktable with one end facing up, then use a backsaw to cut the tenon cheeks (Photo 6). Keep the saw kerf on the waste side of the layout line.

After making all the cheek cuts, make a guide from a 2-in.-thick block of wood for cutting the tenon shoulders. For the side rails, cut the end of the guide block at the specified angle (Photo 7). Lay out and cut the shoulders at the top and bottom edges of each tenon. Finally, use a sharp chisel to pare the tenon cheeks so the tenons fit their respective mortises.

Lay out the curved back-rail shape, including the tenons, on the appropriate blanks, then cut the tenons using the same technique. Clamp one of the blanks, inside face up, to the worktable and make a series of cuts with your circular saw to define the inside face of the rail (Photo 8).

Use a plunge router and edge guide to cut the mortises. Clamp a second leg to the workpiece for extra support.

Clamp a chair rail to the side of your worktable and use a backsaw to make the tenon cheek cuts.

Make a guide by cutting the side-rail angle on 2-in. stock. Clamp it to the rail and hold the saw against its end.

Use your circular saw to make a series of cuts that stop about 1/16 in. above the inside curve of each back rail.

Keep the cuts about 1/16 in. above the layout line. Then chop away the large waste chunks with a chisel (Photo 9). Smooth the concave surface with a spokeshave, working from both ends toward the center to keep the grain from tearing (Photo 10).

Turn the blank over, chop away most of the waste from the convex surface of the rail (Photo 11) and smooth with a block plane or spokeshave.

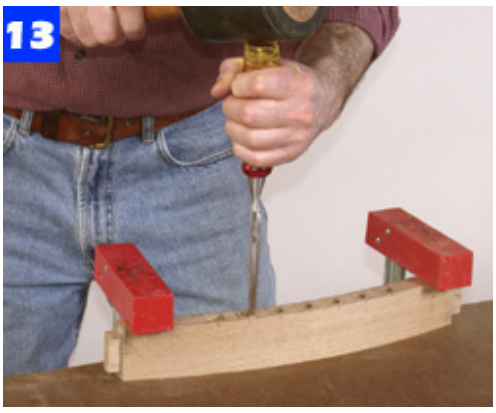
Lay out the slat mortises in the side and back rails, and use a 1/2-in.-dia. drill bit, depth stop and doweling jig to bore away most of the waste from each mortise (Photo 12). Finish the mortises with a chisel (Photo 13) and chamfer the top of each rear leg as shown in the drawing.

Then, use a sharp chisel and a mallet to chop away the waste from the inside curve of the back rails.

Smooth the curve with a spokeshave. Work from both ends toward the center to avoid tearing out the grain.

Use a chisel to remove most of the waste from the convex side. Then smooth with a plane or spokeshave.

Use a 1/2-in.-dia. bit, doweling jig and depth stop to bore out most of the waste from each slat mortise.



Securely clamp a rail to the worktable, square the mortise walls and remove the remaining waste.

Assembly
Install the slats in a bottom side rail (Photo 14), then fit the top rail over the slat ends. Repeat for the opposite side and set the two subassemblies aside. You don't need any glue if the slats fit snugly.

Assemble the slats with the curved back rails. Then, apply glue to the upper and lower back-rail tenons and leg mortises, and join the back parts. Clamp the joints and compare opposite diagonals to check that the frame is square (Photo 15).

Apply glue to the front-rail/leg joints, assemble the parts and clamp. When the glue has set, join the side-rail/slat subassemblies to the front and rear legs (Photo 16). Stand the chair on a flat surface to check that the legs are even. If necessary, adjust the clamps to pull the frame into alignment.

Lay out the corner-block angled ends and cut them to length with a backsaw. Bore and countersink pilot holes as shown in the drawing, and install the blocks with 1-1/2-in. flathead screws (Photo 17).

Lay the chair on its side and clamp one of the rockers to the legs, positioning it as shown in the drawing. Mark the location of the rocker on two of the legs (Photo 18), remove the rocker and cut the legs with a backsaw. Repeat for the other rocker. Test the fit between the legs and the rockers, and make any necessary adjustments so the rockers fit tightly against the leg ends.

When you're satisfied with the fit, clamp the rockers to the chair and drill a 1/2-in.-dia. hole through the rockers into the bottom end of each leg (Photo 19). Cut a dowel for each joint about 1/2 in. longer than the hole depth. Use a sharp chisel to cut a small groove down the length of each dowel to allow any trapped glue to escape.

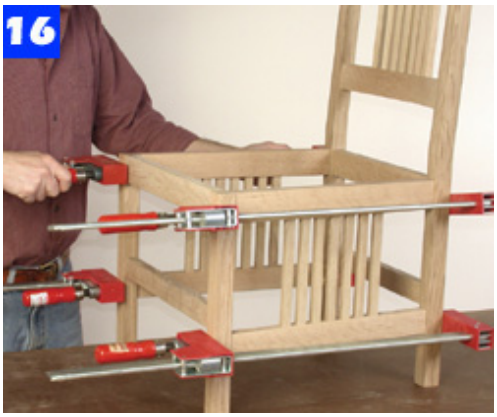
To ensure a strong joint, we used epoxy for the leg/rocker joints. Mix the epoxy according to the instructions and spread some in the holes and on the dowel surfaces. Tap the dowels into the holes and allow the epoxy to cure. Saw the protruding dowels about 1/16 in. above the rockers, and pare the remaining waste with a sharp chisel.

Finishing
Sand all of the chair surfaces with 120-, 150-, 180- and 220-grit sandpaper, dusting off thoroughly when changing grits.

To achieve a traditional medium brown finish, we stained our chair with Behlen Solar Lux American Walnut. This solvent-based stain dries very quickly, so for application

Install slats in the rails. You don't need glue unless the slats are too loose. Then add the remaining rails.

Spread glue and assemble the back frame. Clamp and compare diagonals to check that the assembly is square.



Join the front and rear leg assemblies to the side rails. Set the chair on a flat surface and clamp the joints.

with a brush or rag it is best to add Behlen's retarder to slow drying and prevent lap marks. Follow the manufacturer's directions for application.

Allow the stain to dry thoroughly before applying a surface finish. We used three coats of Waterlox Original Sealer/Finish. Liberally coat all surfaces using a brush or rag. Allow the finish to soak into the wood for about 30 minutes, then wipe off any excess and let it dry overnight. Lightly sand the surface with 320-grit sandpaper and remove sanding dust before applying a second coat. Apply the third coat the same way. After overnight drying, burnish with 4/0 steel wool and polish with a soft cloth.

Take your chair to an upholsterer to have a slip seat made. While we chose a leather seat, you can use any material that suits your decor. Fasten the seat to the chair with screws driven through the corner blocks into the seat base platform.

Cut corner blocks and countersink pilot holes. Install the blocks to the chair rails with 1-1/2-in. flathead screws.

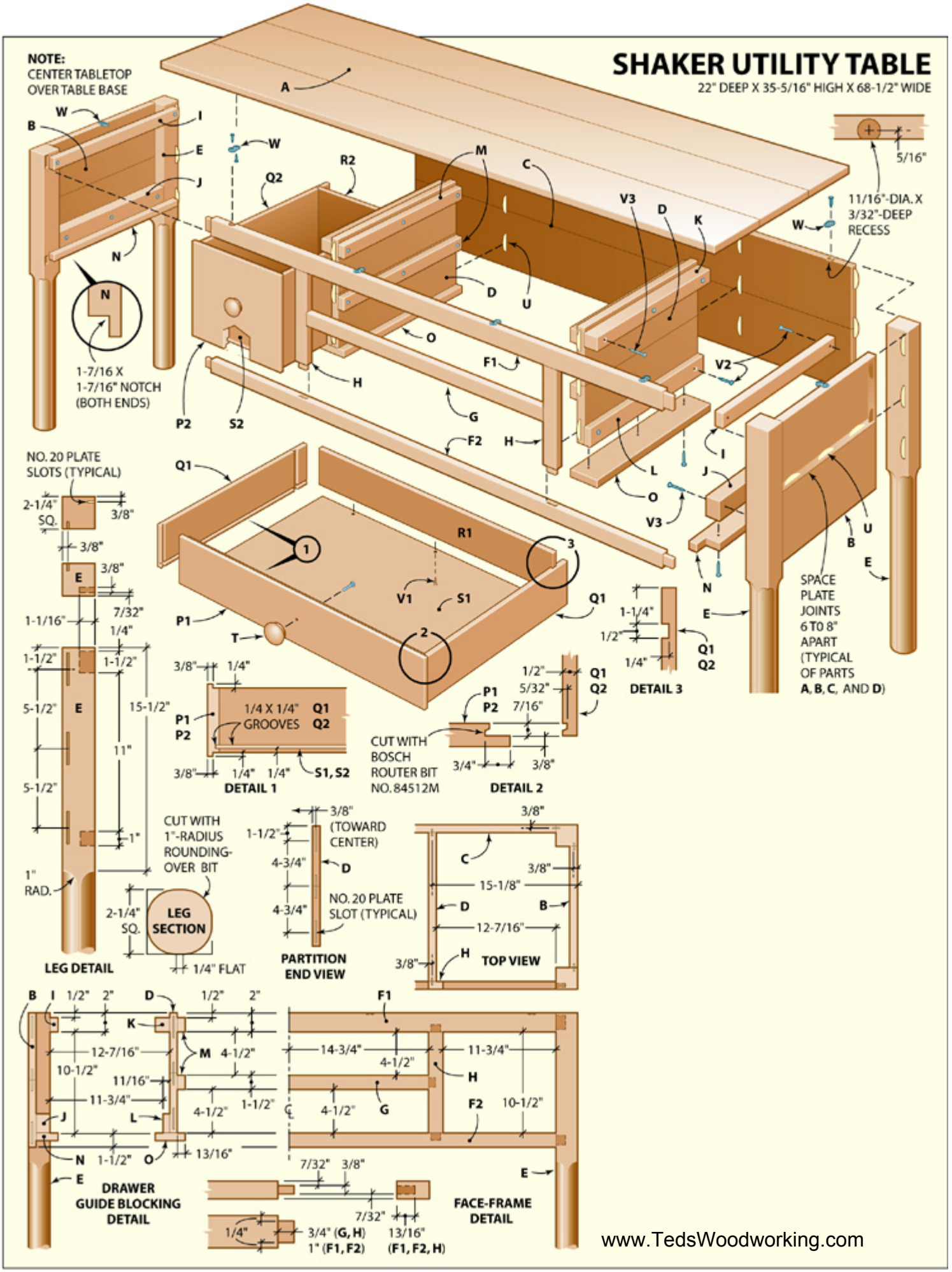
Clamp a rocker to the chair legs and mark the position of the rocker joint. Carefully cut the legs and test the fit.

Clamp the rockers in place and bore a 1/2-in. hole through the rockers into the legs. Epoxy a dowel into each hole.

SHAER ~~STYLE~~ TABLE

SHAKER UTILITY TABLE

22" DEEP X 35-5/16" HIGH X 68-1/2" WIDE



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MATERIALS LIST--SHAKER TABLE		
Key	**No.**	**Size and description (use)**
A*	1	13/16 x 22 x 68-1/2" maple (top)
B*	2	13/16 x 14 x 15-1/2" maple (end)
C*	1	13/16 x 14 x 56" maple (back)
D*	2	13/16 x 12-1/2 x 18-3/8" maple (partition)
E	4	2-1/4 x 2-1/4 x 34-1/2" maple (leg)
F1	1	13/16 x 2 x 58" maple (top rail)
F2	1	13/16 x 1-1/2 x 58" maple (bottom rail)
G	1	13/16 x 1-1/2 x 31" maple (center rail)
H	2	13/16 x 1-1/2 x 12" maple (mullion)
I	2	13/16 x 1-1/2 x 18-3/8" maple (runner)
J	2	1-7/16 x 2 x 15-1/2" maple (runner)
K	2	1-1/2 x 1-1/2 x 18-3/8" maple (runner)
L	2	11/16 x 2 x 18-3/8" maple (runner)
M	4	13/16 x 1-1/2 x 18-3/8" maple (runner)
N	2	13/16 x 2-1/4 x 18-3/8" maple (runner)
O	2	13/16 x 3-1/8 x 18-3/8" maple (runner)
P1	2	13/16 x 4-15/16 x 29-7/8" maple (drawer face)
P2*	2	13/16 x 10-15/16 x 12-1/8" maple (drawer face)
Q1	4	1/2 x 4-7/16 x 19-3/16" maple (drawer side)
Q2*	4	1/2 x 10-7/16 x 19-3/16" maple (drawer side)
R1	2	1/2 x 3-15/16 x 28-7/8" maple (drawer back)
R2*	2	1/2 x 9-15/16 x 11-1/8" maple (drawer back)
S1	2	1/4 x 17-3/4 x 28-7/8" plywood (drawer bottom)
S2	2	1/4 x 17-3/4 x 11-1/8" plywood (drawer bottom)
T	4	drawer pull
U	as reqd.	No. 20 joining plate
V1	as reqd.	1" No. 6 rh woodscrew
V2	as reqd.	1-1/2" No. 8 fh woodscrew
V3	as reqd.	2" No. 8 fh woodscrew
W**	10	tabletop fastener, Rockler No. 21650

Stock Preparation
The first step is to straighten, or joint, the edges of the pieces you'll glue together to make the wide panels. To do the job with a router, first make a straightedge guide. A 4- or 5-in.-wide piece ripped from the edge of a sheet of plywood or hardboard should work.

Clamp the straightedge guide to each maple piece and run the base of the router against the guide to trim the edges of the boards (Photo 1).

Determine the widths of the pieces you'll need for the tabletop and the side and back panels. Then, use a circular saw with a ripping guide to cut the stock to width. Leave each piece about 1/16 in. wider than necessary so you can joint the cut edge and remove the saw marks. Crosscut the pieces at least 2 in. longer than the finished panel lengths.

While you don't need them for strength, your assembly will be easier if you use joining plates to align the panels. Mark the locations of the plates and cut the slots (Photo 2).

Apply glue to the mating edges of the panels and also spread glue in the plate slots and plates. Assemble the panels, clamping the joints to pull them tight (Photo 3). After the glue on each panel has set for 20 to 30 minutes, scrape off any excess.

When the glue has completely set, remove the clamps and crosscut the panels to length (Photo 4).

Install a straight 1/2-in. bit in your router and use a straightedge guide to joint the edges of the maple stock.

Clamp your work to the table, and cut the joining plate slots for assembling the wide top, side and back panels.

Use clamps to pull the panel joints tight. A clamp every 10 to 12 in.should provide adequate pressure.

Clamp a straight board squarely across each panel and use it as a guide for crosscutting with your circular saw.

Making The Legs
While your circular saw may have the capacity for a 2-1/2-in. cut, maple is very hard and can be tough on a saw. It's best to rip the table legs in two stages. Using a ripping guide, cut halfway through the stock, then flip the piece over and finish from the other side (Photo 5). Repeat for each leg. Rip the leg blanks 1/16 in. wider than finished dimension and use a plane to bring the pieces to correct size. To make shaping the legs easier, leave the leg blanks several inches longer than required.

Mark the round-to-square transition points on each leg, and leave at least 2 or 3 extra inches at the bottom end of the blanks for clamping. Clamp one of the blanks to your worktable and use a 1-in.-rad. rounding-over bit to rout each corner of each leg (Photo 6). Stop the cuts about 1/4 in. shy of the transition points.

After routing all of the legs, use a gouge or rasps and files to shape the transition between the rounded and square portions of the legs (Photo 7).

Note that the legs won't be perfectly round, but will have a small flat surface on each side. When sanded smooth, however, you'll barely notice that they are not shaped to a perfect cylinder.

Cutting The Joints
Lay out and rout the mortises in the legs and square the ends with a chisel (Photo 8). Then, crosscut the legs to finished length. Locate and cut the plate slots for joining the back and side panels to the legs (Photo 9).

Rip and crosscut the face-frame parts to size, and lay out the mortise-and-tenon joints according to the plan. Rout the mortises in the mullions and the top and bottom rails, and square the ends with a chisel.

Install a straight bit in a router table, and use a miter gauge to guide the pieces as you cut the tenon cheeks (Photo 10).

Mark the tenon shoulders on each piece, and use a dovetail saw or backsaw to make these cuts. Test fit each joint. If one is too snug, sand the cheeks until the parts slide together smoothly. If a joint is too loose, glue a veneer shim to the tenon cheek.

Use a ripping guide to help saw the leg stock. Cut half the depth from each face to avoid overloading the saw.

For the look of lathe-turned legs, use a router with a 1-in.-rad. rounding-over bit on each leg corner.

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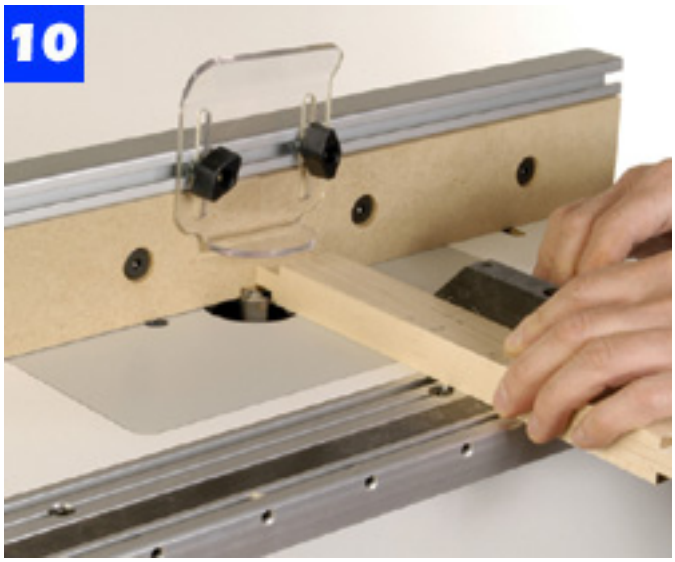
Use a gouge or rasps and files to shape

the transition between the round and square sections of each leg.

Rout the leg mortises with a 3/8-in.-dia. spiral up-cutting bit. Then, square the mortise ends with a sharp chisel.

Cut the plate slots in the legs for joining the sides and back. Cut corresponding slots in the side and back panels.



Use a router table and a 1/2-in. bit to shape the tenons on the face-frame ends. A miter gauge guides each cut.

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Assembly

Spread glue in the face-frame mortises and on the mullion and center-rail tenons (Photo 11). Assemble the frame, apply clamps, and compare opposite diagonals to see if the frame is square. Next, glue and assemble the leg/face-frame parts (Photo 12).

Glue and clamp the rear leg to the back-panel joints. When the glue has set, lay out the positions of the partitions and joining plate slots. Clamp a straightedge to the back and face frame as a guide for cutting these slots.

Apply glue for securing the sides and partitions with the face-frame assembly. Position the panels, clamp them to the frame, and use a square to check that the panels are perpendicular to the face (Photo 13). Next, join the back-leg assembly to the side and partition panels. Apply clamps and check for square (Photo 14).

Cut the drawer runners to size. Bore and countersink pilot holes in each piece and install them to the side and partition panels (Photo 15).

Coat all face-frame joint surfaces with glue. A small brush and wooden applicator make the job go smoothly.

After assembling the face-frame parts, join the frame to the front legs. Keep the clamps in place until the glue has set.

Join the partitions and sides to the face-frame assembly with plate joints. Check the assembly with a square.

Complete the table base by joining the back subassembly to the sides and partitions. Then check for square.

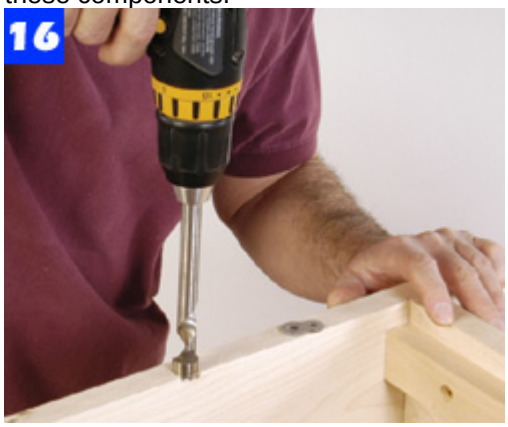
After cutting the drawer runners to fit, bore the pilot holes for the screws and install these components.

Mark the locations of tabletop fasteners along the top edge of the table base. Use an 11/16-in.-dia. multispur bit to bore the 3/32-in.-deep recess for each fastener (Photo 16), then bore pilot holes for the screws and install the hardware.

Invert the tabletop on a padded surface and position the base over it with the proper overhang on each edge. Bore holes for tabletop-fastener screws, and attach the top to the base.

Drawer Construction

Glue up the face, side and back panels for the deep drawers, then rip and crosscut all drawer parts to size. We cut the joints between the drawer sides and faces with a



Bore recesses for the tabletop fasteners. Install the fasteners and mark their

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drawer-lock-joint router bit (Bosch No. 84512M). Install the bit in the router table and use it to cut the locking joint on the drawer-face ends (Photo 17). Since this is a deep cut, take two or three passes to reach the full profile.

Readjust the router table to cut the mating joints on the drawer sides (Photo 18). Clamp a backer board to the trailing edge to prevent chipping.

Use a 1/2-in.-dia. straight bit in the router table to cut the rabbet at the top and bottom edges of the drawer faces, and the dado in drawer sides for the backs. Then, install a 1/4-in. bit and cut the grooves for drawer bottoms.

Assemble the drawers with glue and clamps (Photo 19). When the glue has set, remove the clamps and slide the bottoms in place. Fasten them with screws driven into the drawer backs. Bore pilot holes for the drawer pulls and install them.

Finishing

Remove the tabletop from the base and sand all table parts to 220 grit. To achieve our golden brown color, we first applied a coat of Bartley Country Maple Gel Stain. Spread the stain with a brush or rag, allow it to set for a few minutes, then wipe off any excess. Allow the stain to dry overnight.

Then, apply two coats of Zinsser Bulls Eye amber shellac. Use a good-quality, natural-bristle brush, and avoid excessive brushing. Allow the shellac to dry for at least 2 hours before lightly sanding with 220-grit sandpaper. Remove any dust and apply two more coats.

Burnish the dry surface with 4/0 steel wool and then buff with a soft cloth. Reattach the tabletop to the base and install the drawers.

positions on the underside of the top.

Use a drawer-lock-joint bit in the router table to shape joints on each end of the front drawer panels.

Hold the stock on end to rout the drawer joint on the drawer sides. A backer board clamped in place prevents tearout.

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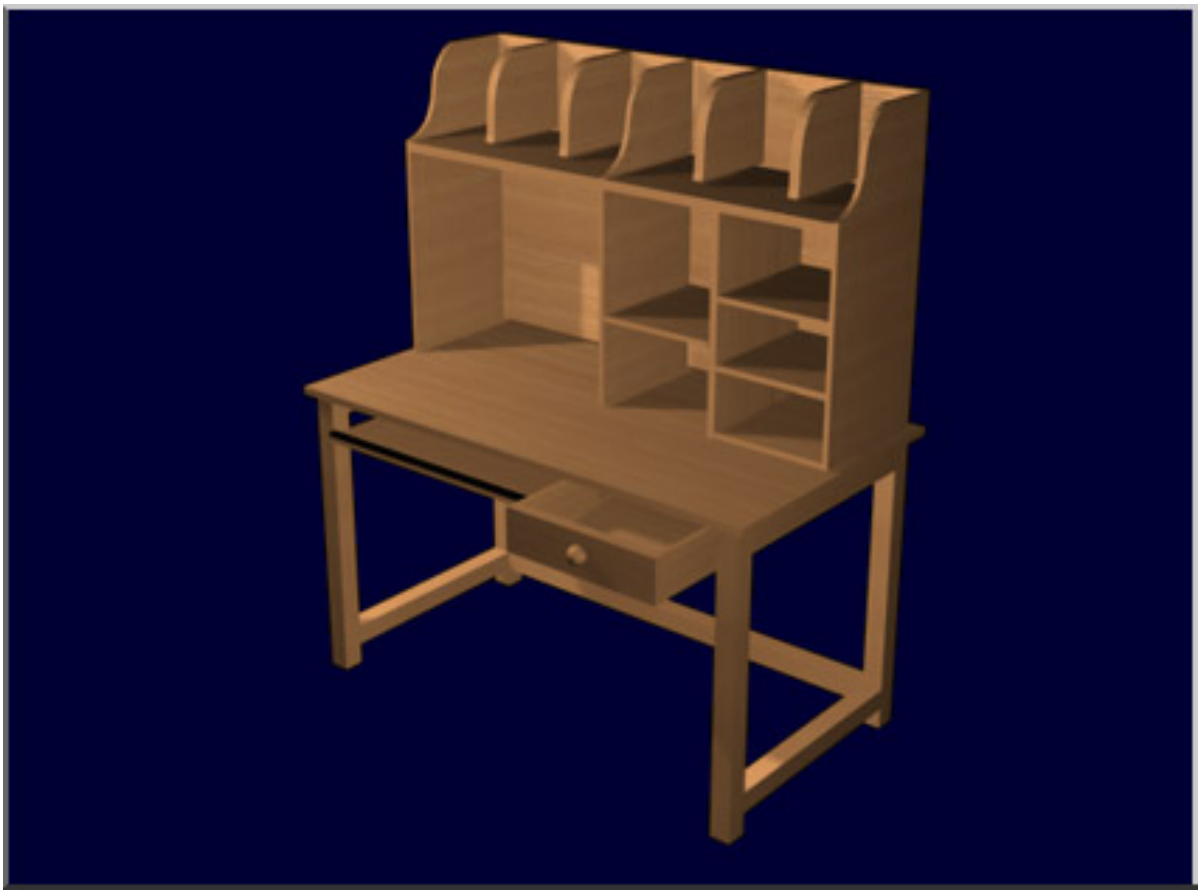
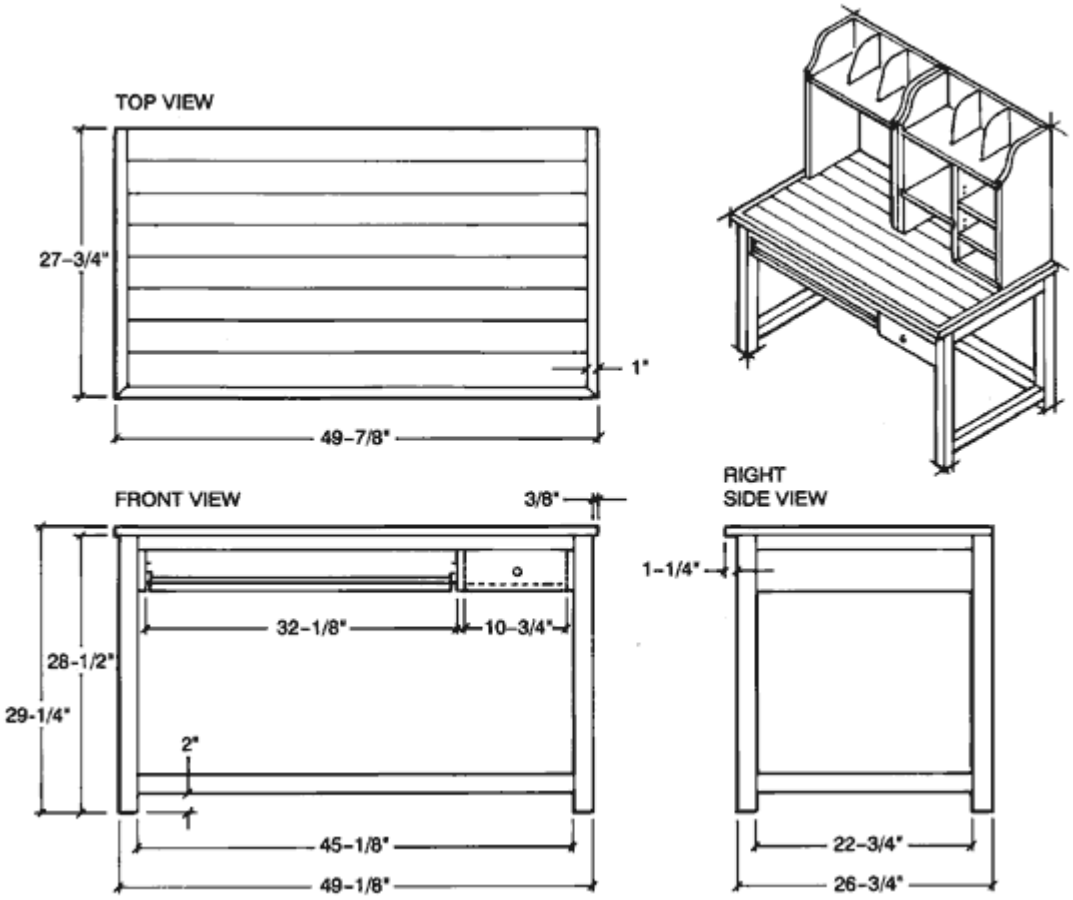
After routing the drawer-face rabbets and the grooves for the bottoms, apply glue and assemble the drawers.

COMPUTER WORKSTATION





Computer Workstation Buying and Cutting List

Key	Parts	Pcs.	Size	Material	Cut From (buy) *see Notes
A	Top	1	3/4 x 26-3/4 x 47-7/8" (OA)	Pine	4/8, 1 x 4
B	Edging, ends top	2	3/4 x 1 x 27-3/4"	Pine	All edging from 1/5, 1 x 6
C	Edging, front top	1	3/4 x 1 x 49-7/8"	Pine	"
D	Legs	4	2 x 2 x 28-1/2"	Pine	1/5, 8/4 x 6
E	Top rails, front and rear	2	3/4 x 1-1/2 x 47-1/8"	Pine	All rails from 1/7, 1 x 4
F	Top rails, ends	2	3/4 x 1-1/2 x 24-3/4"	Pine	"
G	Rear stretcher	1	1-3/4 x 1-5/8 x 47-1/8"	Pine	All stretchers cut from 1/7, 8/4 x 8" board
H	End stretchers	2	1-3/4 x 1-5/8 x 24-3/4"	Pine	"
I	Dividers	3	3/4 x 4-1/4 x 26-1/2"	Pine	1/8, 1 x 6
J	Cleat	1	3/4 x 1-1/2 x 22-3/4"	Pine	Scrap box
K	Drawer shelf	1	3/4 x 12-1/4 x 26-1/4"	Pine	1/5, 1 x 8
Drawer					
L	Drawer sides	2	1/2 x 2-5/8 x 12-1/2"	Pine	1/5, 1 x 4
M	Drawer back	1	1/2 x 1-7/8 x 10-5/8"	Pine	1/1, 1 x 4
N	Drawer front	1	3/4 x 4-3/16 x 12-1/4"	Pine	1/18, 1 x 6
O	Drawer bottom	1	1/4 x 10-1/16 x 11-15/16"	Plywood	1 sq. ft.
Keyboard Platform					
P	Keyboard platform	1	3/4 x 14-5/8 x 30-7/8"	Pine	1/5, 1 x 4
Q**	Hand rest	1	3/4 x 2 x 30-7/8"	Pine	1/1, 1 x 4
R	Stop blocks	2	3/4 x 3/4 x 3-1/2"	Pine	1/18, 1 x 6

Procedure

Construction begins with the workstation table. Be aware that the dimensions used are standard, since the aim is to create a piece of furniture that provides optimum comfort for the person working at it. The monitor and keyboard elevations are of primary importance. You may want to evaluate the most comfortable heights for working at a computer and, should they vary from the shown dimensions, make changes on the drawings so you can custom-build the table to suit your own needs.

You are advised to work with the dimensions given on the drawing, however, since these are in accord with accepted architectural standards.

START WITH THE TABLE

1. Start by cutting the 1 x 4 stock for the top slightly longer than the top's finished length.

2. Check all edges for warp, cupping and square: Board edges must be perfectly true if you are to achieve almost-invisible joints in edge-joined work. To be sure that yours will be, run all board edges through the jointer.

3. Next, lay out the boards on your worktable and arrange them so they produce the most pleasing grain appearance. At the same time, make sure you flip the boards so that the annular rings in abutting boards alternate (i.e.: The rings of the third board should be positioned the same as the rings of board number one, and, so on). Annular rings are alternated in edge-joining to further minimize chance of warping or cupping.

4. When satisfied with board arrangement for the top, using a pencil, make marks where the biscuits are to go.

5. Using a plate joiner and the marks you just made, plough the biscuit grooves to suit no. 20 biscuits.

6. Assemble the table top using glue and no. 20 biscuits.

7. Use at least three bar clamps to hold the setup securely while the glue dries. Place one near each end and the third, centered on the opposite side of the table top.

8. Allow clamped setup to dry for 24 hours.

9. The next day, remove clamps and scrape off any glue squeeze-out using a sharp cabinet scraper. Finish the smoothing step by belt-sanding the complete top; first with 80-grit abrasive, then with 100-grit.

10. Finally lay out the top for exact width and length. Using either a table or circular saw, cut the ends to produce top's exact length. Then, rip the top to its exact width on the table saw. Note that the top (at this point) is cut to the dimensions shown in the drawing--without the edging strips in place on front and side edges. Set top aside.

11. Rip edging strips B and C to size and install them on the top using glue and 1-1/2 in. finishing nails. Use miter joints at the corners and be sure to use glue in those joints. The next day, after the glue has dried, secure the miter joints by driving a pair of opposing 1-1/4 in. brads through each mitered corner. Finally, set all nailheads slightly below the surface. Set top aside.

Cabinetmaker's Tip: When gluing up a table top, professionals never use boards wider than 1 x 4 nominal. Be aware that wider boards greatly increase the risk of warping and cupping as the wood dries, generally during the winter months or in a heated home.

12. Cut the remaining structural members for the table to size and length. Notice that the legs are a full 2-in. square. You may be required to alter the leg dimensions, depending upon what your lumberyard has in stock. If you cannot get full 8/4 stock, it may be necessary to trim the stock you have to create legs either 1-3/4 or 1-7/8 in. square.

Cabinetmaker's Tip: Do not cut any of the materials for either the keyboard platform or drawer until after your basic table is built and assembled. At that time you can take actual dimensions, sizes, etc. for these members directly from the table. This will ensure both perfect fit and minimal wasted materials.

13. Carefully lay out for the mortises in the legs. If available, use a bench top mortiser to bore the mortises in the legs. If your shop lacks this useful tool, create the mortises by boring overlapping 1/2-in.-dia. holes and cleaning the holes square using sharp chisels.

14. Lay out the stretchers (to legs) and make mating match marks where each stretcher meets a leg. (Note: Use marks that won't confuse later like I, II, III and so on.) Then mark each piece for tenon to be cut so it will mate tightly with its mating leg mortise. Carefully cut the tenons using a back saw; clean up tenons as necessary with a sharp wide chisel. Test-fit all undercarriage pieces with tenons in their respective leg mortises. Do this testing dry, without glue, before proceeding with final assembly.

15. Next, set up the table saw with dado head and rip fence so you can plough the grooves, which will receive the tabletop hold-downs. These will be ploughed in the inside surfaces of the front and back rails.

16. Because it goes a lot faster with the parts disassembled, sand all parts smooth using a belt sander and 120-grit paper.

17. Assemble the table as shown in the drawing, using glue. Working quickly, locate the dowel positions on the legs and bore the necessary holes so that the fully seated dowels will be inserted through the tenons and into the leg on the far side. Apply glue to dowels before inserting them into their holes; tap dowels home with a wooden mallet.

18. Check the table setup for square using a framing square. When satisfied with squareness, secure the carcass by tacking diagonal braces across opposing corners. Then clamp the setup so the joints will be immobile while glue sets.

19. Use appropriate-length bar clamps: You will need two with 5-ft. capacity and three with 30-in. capacity.

20. The next day, the top can be positioned on a worktable, bottom-side up, and the table undercarriage (also turned upside down) located on it. Check with a ruler to make certain the top's ends are equally distant from the end stretcher plane, and that the top's rear edge is flush at back. When the undercarriage is properly positioned, hold it that way with a couple of c-clamps while you position and install the hold-downs with wood screws. When all is secured, remove the c-clamps and flip the table right side up.

Cabinetmaker's Tip: Though it is a basic technique, make sure you protect the wood surfaces when clamping. If your clamps do not have plastic shields, use scrap wood between clamp jaws and wood surface to prevent jaw marks from clamp pressure.

21. Cut parts I and K for the drawer compartment to size and install on the table using carpenter's glue and 1-1/4 in. screws (or air-driven 1-1/2 in. nails). (see illustration)

22. Cut the parts for the drawer and sand all members smooth, working up to 120-grit paper before assembling the drawer. Take time to study the drawing to be sure you understand how the drawer front is rabbeted; i.e., the drawer front should conceal the compartment members (parts I in illustration).

23. Lay out and bore the hole for the drawer knob in the drawer front.

24. Insert drawer into its recess and position it in the closed position. Check the front to make sure that it fits, and conceals the vertical members behind the front. Make any necessary adjustments.

25. To prevent the (short) drawer from falling out if pulled forward too vigorously, install the shaped 1/4-in. plywood stop as shown. Bore a pilot hole through the plywood. Then, hold the stop in place with a 5/8-in. rh screw. Tighten the screw until the stop can be rotated to stay in the vertical position. Finally, install the drawer and rotate the stop to the vertical (drawer stop) position, and tighten the screw a tad more to ensure it remains vertical.

26. Next, go to work on the keyboard platform. Cut the boards for it and edge-join them using glue and no. 10 biscuits. As you did for the tabletop, alternate the annular rings of abutting boards to minimize chance of warping. Apply clamp pressure and leave the setup overnight.

27. Next, lay out and install the platform's slide hardware on table and platform sides. Install the keyboard platform's stop blocks at the ends of the table-mounted slides. Note: Do not use glue on the stop blocks since you may have to reposition them in the future.

28. Insert platform into the table.

29. Push platform to the closed position to make sure it is flush with table front; adjust stop blocks if it is not.

30. Cut the piece of lumber for the hand rest and shape it using a block plane and belt sander. When satisfied with its contour, install it on the platform using glue and countersunk wood screws from below.

Except for its final sanding and the finishing steps, your table is now complete.

Optional: You may want to install furniture glides on the bottom surface of all legs to prevent (or, at least minimize) the table from rocking should it eventually be placed on an uneven floor. If you do decide to add glides, buy the 3-prong type of at least 7/8-in. dia.

Building the Hutch Top

The hutch top for the Computer Workstation is easier to build than the desk. However, since the upper section of this project is in prominent view, build and finish it with the same care, patience and precise workmanship that you used in building the table.

Build the hutch top in two sections; these are then joined for maximum rigidity after being installed on the desktop. By doing this, it's possible to alter the design of one or both units to suit your equipment and taste.

The hutch size, overall, is determined by two factors:

(a) The left unit is sized to accommodate a 21-in. monitor and,

(b) The right hutch will store computer-related paraphernalia such as CDs, floppies, notepads, etc.

As mentioned earlier, hutch sizes can be altered. If your monitor varies from 21 in. or if you want to customize the unit to adapt it for other uses or storage, you may take some liberties in its design.

Before You Begin

1. Start by cutting the boards for the legs (sides) to length, but cut them slightly longer than the finished sides will be. (In this case, that means about 30 in.) Note that each side consists of two lengths of 1 x 6 and one length 1 x 4. This will give you four stacks of three boards each which, when joined, will be both longer and wider than the required 13 in.

2. Lay out each set of three boards to achieve the best grain match for each leg and, at the same time, try to alternate annular rings on abutting boards to minimize chance of warping or cupping. When satisfied with arrangement, lightly draw a cabinetmaker's triangle across the face of each of each setup: This way each set of three boards can be quickly returned to your preferred layout of them.

3. Next, joint all edges in the four piles; check the mating edges as you go (an easy step because you have the cabinetmaker's triangle for reference) to ensure that joints will be tight and neatly matched when the boards are joined.

4. Align the first set of three boards for the first leg and carefully mark biscuit locations. Important: make sure you do not position a biscuit in the top portion of each leg area, which is shaped later; you do not want the shaping to expose a biscuit in the edge. Plough the mortises to receive the no. 20 biscuits. Then, making certain you keep the three boards together as a set, put them aside on the work bench while you repeat this procedure for the following three sides (legs).

5. Start by gluing-up the boards for the 13-in.-wide "legs" or sides. Refer to your cabinetmaker's triangle to quickly return the boards to the preferred grain layout you selected earlier. Position each set of boards as you work. For legs glue-up, you will need at least 12 bar clamps, 3 per setup. Have these, as well as the glue, a glue brush and biscuits at hand before starting the assembly step.

6. Apply glue to mating board edges and biscuits and assemble the first three boards. Ends should be aligned and boards should lie flat against bars (i.e., no bow) when clamp pressure is applied. To minimize the chance of cupping or bowing occurring when clamp pressure is applied, use a pair of clamps on one side of the boards, positioned about 4 in. from each end and one clamp at center on the opposite side. Put the clamped setup aside and allow to dry for 24 hours. Repeat assembly procedure for the remaining three sides.

7. The next day, remove the clamps and trim the four legs so all four are exactly the same size--13 in. wide by 29 in. long. Crosscut all boards to length on the radial arm saw, using a stop block to ensure all are the same length. Then, on the table saw, rip boards to width, taking some stock off both front and back edges (this will remove any edges dented during handling, clamping, etc.).

8. Tack two of the legs together for the right hutch (R1) and two for the left (L1) after aligning each pair so all edges are flush. Hold them that way for the shaping which follows, using a half-dozen or so 1-1/4 in. brads driven flush.

9. Refer to the drawing of the shaped top, shown on 1-in. squares in the drawing, to make a template of 1/4-in. hardboard or plywood. When satisfied with template's layout, cut it out using saber or scroll saw. Sand the cut edge smooth.

10. Use this template to trace the shaped tops to the two pairs of legs you previously tacked together. Cut out the shape using saber or scroll saw.

11. Sand the scroll shapes smooth using either a spindle or drum sander chucked in the drill press.

Note: Since the dividers used on the fixed top shelves repeat the symmetry of the scroll shape used on the legs, set the scroll template aside for reuse later. When you come to make the dividers, you can simply refer to the drawing for shape then re-cut the template for use as a divider template.

12. Repeat the board layout and edge-joining steps to make all the shelves for your two units both finished and adjustable. All of these should be slightly oversize overall when they're glued-up; they will be trimmed to fit exactly after hutch units are assembled.

Cabinetmaker's Tip: You can edge-join the boards for both hutch tops in a single session as long as you use identifying marks. Make marks lightly with a soft pencil on the back edges of boards. (Use R for right cabinet; L for left.)

Cabinetmaker's Tip: Since you have cut your boards so that each side (leg) setup will be slightly oversize when assembled, there is no need to place scrap blocks between the clamp faces and wood (to prevent marred edges). Board lengths and widths will be trimmed in the next step, and clamp marks will be cut off.

Note: The following instructions take you through the steps for building the left hutch, the one that houses the monitor. The same construction steps are used to build the right hutch except for the addition of the adjustable shelves. The required steps for installing these are explained below.

13. Before laying out the shelf dadoes on the legs for the left hutch, measure the monitor that will be used on your workstation. Everything begins with that dimension. Make sure that the distance from leg bottom edge to bottom plane of dado provides adequate clearance for your monitor's height. (Your monitor size determines the fixed shelf location in the left hutch.) You will have to alter the right hutch dimensions so the two fixed shelves remain in line. Also, if the left hutch width dimensions are altered, the right hutch must be adjusted a corresponding measurement so that the hutch sits on the table with a 1-in. setback from table edge, left and right.

14. Since the legs (L1) for the unit have already been sized (step 7), you can now lay out the dadoes to receive the fixed shelf (L2).

15. The dadoes for the fixed shelf should be perfect mirror images in left and right legs, so make sure the legs will be exactly opposite each other in the finished cabinet. Here's how to do it:

16. Position the two legs on your worktable back-edge to back-edge and clamp them so they cannot move.

17. Lay out for the dado to be rabbeted in both legs and plough it using a 3/4-in. straight router cutter set to a depth of 3/8-in.

Cabinetmaker's Tip: On work such as this, where there is no room for error, you must always use a guide when ploughing with a router. Be certain you clamp on a guide which puts the router cutter right on the mark. Hold the router shoe firmly against the guide as you cut and, to further minimize chance of a cutting error, push the router with a slow, easy-to-control feed rate. To be extra safe, you can clamp a guide so both sides of the router shoe will be guided and to eliminate any possibility of the router "walking" off the cutting mark. If you opt to cut your dadoes using the table saw, make certain you use a miter gauge hold-down to prevent lateral movement of the work piece as the saw blade does its cutting. You must use a stop to position each workpiece accurately before it is pushed into the spinning blade. This ensures that the dadoes in both legs are positioned the exact distance from the leg end. If you have never done repetitive crosscutting on the table saw, discuss this step with your instructor before proceeding.

18. Next, insert a 3/8-in. rabbet cutter in your router and plough the blind rabbets in the back edges of both legs to receive the back (L3).

19. Assemble the two legs, fixed shelf and back without glue so you can check all for fit; use small (1-1/4 in.) brads if necessary to temporarily hold the parts together so you can do your visual check. Now lay out for the 5/16-in.-wide dadoes that will hold the dividers used in the fixed top shelf. Mark both the shelf and the back at this time.

20. When satisfied with fit, disassemble the hutch and abut the fixed shelf and back with the marks for the dadoes lined up. Clamp the boards together so they will not move and, starting at the back edge, rout the dadoes across, stopping shy of the front edge in order to create the blind dado as shown in the drawing. After routing, the front round corner can quickly be made square (to receive the divider) using a sharp 1/4-in.-wide chisel.

21. Reassemble the hutch using glue and fasteners of choice. Note: Because of their superior holding ability, you can use pneumatically driven 1-1/2 in. nails to join parts here. These are driven slightly below the surface and the indents can be filled with Wood Filler. Or, if preferred, 1-1/2 in. fh wood screws which are then covered with dowel plugs. If you opt for the latter, remember that you must lay out for the screw pilot holes - for body, shank and counterbore - before you start the assembly step.

22. With left hutch complete, stand it upright on the workstation table, flush at back and with approximately 1-in. setback from the left table edge. Then, measure the distance from the outside plane of the right leg to the same width setback at the right table edge. This measurement is the outside (i.e., overall) width dimension of your right-hand hutch. As stated earlier, this measurement may differ from our drawing depending upon how the left-hand hutch is sized. If there is variance with the plan drawing, now is the time to calculate all dimensional changes and to mark them on your drawing--before starting any work on your project wood for the right hutch.

23. The right-hand hutch is constructed using the same procedure as for the left--except for two steps you must take before assembly: a) The holes for the adjustable shelves should be laid out and bored; you must be able to fit the monitor between legs

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R1 and R4 after the unit is assembled. And, b) the dado for the middle leg (R4) must be routed in the underside of fixed shelf. Attempting this after assembly could result in damage to shelf legs. When the right unit is complete, set it atop the table abutting the left unit. Recheck both the left and right setbacks, the tabletop reveal, to make sure the left and right legs are equally distant from table edge. If the distance varies, even slightly, move units left or right to achieve that goal.

24. When satisfied with their location, position a pair of handscrew clamps on the legs at center to hold the two units together. With a pencil, lightly mark the front corner of both the left and right (outside) legs and make match marks on tabletop. Next, carefully locate the points and make marks on both the tabletop and the legs to indicate where you must bore the holes to receive the dowels, which serve as keepers when the unit is assembled. Note that this is back about 1 in. from front edge of vertical and centered on leg width.

25. With handscrew clamps still in place, lay out for the Teenuts® to be installed on the middle legs. The fastener's locations aren't critical but, for the sake of craftsmanship, they should look precisely placed. Then bore the needed holes.

26. From the left side (i.e., the monitor's hutch), start by boring the large dia. holes to suit the Teenut, to 1/2-in. depth. Then insert a 5/16-in. bit and bore through at center of each counterbore to receive the machine screw.

27. Then switch to a countersink and, in the right hutch, countersink all four holes to receive the machine screw head.

28. Tap the Teenuts in place and secure them with the machine screws.

29. With the hutch unit still aligned on the table, position the mending plates on the three legs; one on each outside leg and the third on the center leg. Mark the four screw hole locations for each plate. Bore all screw pilot holes but do not install the mending plates as yet.

30. Carefully tilt the hutch back until it is fully supported and resting on its back. Next, bore the 3/8-in.-dia. holes in outside legs and the table top to receive the keeper dowels. Then, glue the dowels into the legs so just about 3/4-in. of dowel protrudes. Glue is used in the one side only so the hutch can be lifted off whenever necessary (i.e., for a move).

31. Wait one day, to make certain dowels are permanently affixed into the legs, then, bring the hutch to the upright position and insert the dowels into the mating holes in the table top. Now you can install the mending plates using the screw holes you bored earlier.

32. Your Computer Workstation is now complete. We also give instructions for an optional box which can be used to hold CDs close at hand. You may, however, prefer to custom design a box to suit the "extras" you frequently work with. In this case, the box shown here is a good starting point for your box.

Note: Leave your workstation assembled until you have completed constructing all the peripheral parts (CD holder, dividers, etc.), because you want to be able to test fit these pieces before finishing the table. When satisfied all parts fit as they should, you can disassemble the hutch and table to simplify the finishing step. Be sure to save all of the hardware and fasteners in a covered container so you won't have to hunt for them when it is time to reassemble your workstation.

Dividers for Top Shelves

To ensure the wood in the dividers matching the wood used in the workstation, we planed 3/4-in. stock from the same pile to 1/2-in. thickness, then created tenons on the bottom and back edges (see below). You could use 1/4-in. plywood here and save a little work, but because of the exposed ply edges, the finished look will not be nearly as handsome.

Since the table saw is used to remove a scant amount of material from the divider stock to create the tenons, read the Cabinetmaker's Tips below to learn the safe way to do this.

Here are the steps for making the dividers:

1. Cut the 1/2-in. stock to the divider size given in cutting list.

2. Next, to work production-fashion, align the edges of the four pieces. Then, while holding them fast, drive three 1-in. brads through the pile.

3. Using your previously made pattern, trace the divider's scroll shape onto the top work piece.

4. Cut all four at one time using the bandsaw.

5. Sand all edges smooth using the stationary belt sander along the straight edges and the spindle sander for the scroll shape. Lacking a spindle sander, chuck a sanding drum in either portable drill or drill press.

6. Separate the pile, remove and discard nails and set dividers aside.

7. Set up the table saw so you can safely remove about 1/8-in. from both sides of each divider, along the bottom and back edges. See Cabinetmaker's Tips, below. Note: The exact thickness to remove will be determined by the actual thickness of your stock and the width of the dadoes ploughed in shelf and back. The tenons you create on the dividers must fit freely in those dadoes.

Cabinetmaker's Tips: Never lay out a shape on your project wood; always make a template or pattern first. You can use either 1/4-in. hardboard or plywood--or even sturdy cardboard. Lay the shape out on your template material following the pattern given in the plan. Cut it out using saber or scroll saw (or razor knife if template is cardboard). File and sand all cut wooden edges to remove "whiskers" before using the pattern to transfer the shape to your project wood.

When a small, identical amount of wood must be removed from a number of surfaces, the most accurate technique is to set up the saw so that the waste is between the blade and fence. That is the case here, where approximately 1/8-in. is removed from both sides of the bottom and back edges. This creates tenons to fit in the dadoes provided for them. However, whenever the saw blade is this close to the fence, there is very real risk of the blade engaging the metal fence: this can be dangerous at worst, blade damaging at best.

For safety, always install and work with a wooden auxiliary fence whenever you are faced with doing this type of cutting on the table saw. In order to cut the dadoes on the 7 x 9-in. dividers, make an auxiliary fence from a length of 1 x 6." Line the board up with the rip fence and with an awl, make prick marks through the holes on your fence. Use 3/16-in. dia. fh machine screws and wingnuts to secure the auxiliary fence to rip fence. Caution: Make certain the screw heads are perfectly flush with the wood's surface when the board is secured tight against the fence by the wingnuts: the work piece must be able to slide past without interference when you make your cuts.

If you have never installed and worked with an auxiliary fence on a table saw, make sure you discuss the setup with your teacher before its installation and use.

The CD Box

The box shown in the plan was built to house a commercially available plastic CD box (see Materials list). Slotted plastic sheets are created for CD storage. Many mail order woodworker's supply houses offer these. They are available in both end and center CD holder configurations and are installed using polyurethane glue. If you want to build a custom CD box, make sure the box (i.e., its overall dimensions) fits in the right-hand hutch.

Making the Box

1. After cutting all parts to sizes shown in drawing, sand them smooth starting with 100-grit and finishing with 120-grit abrasive paper.

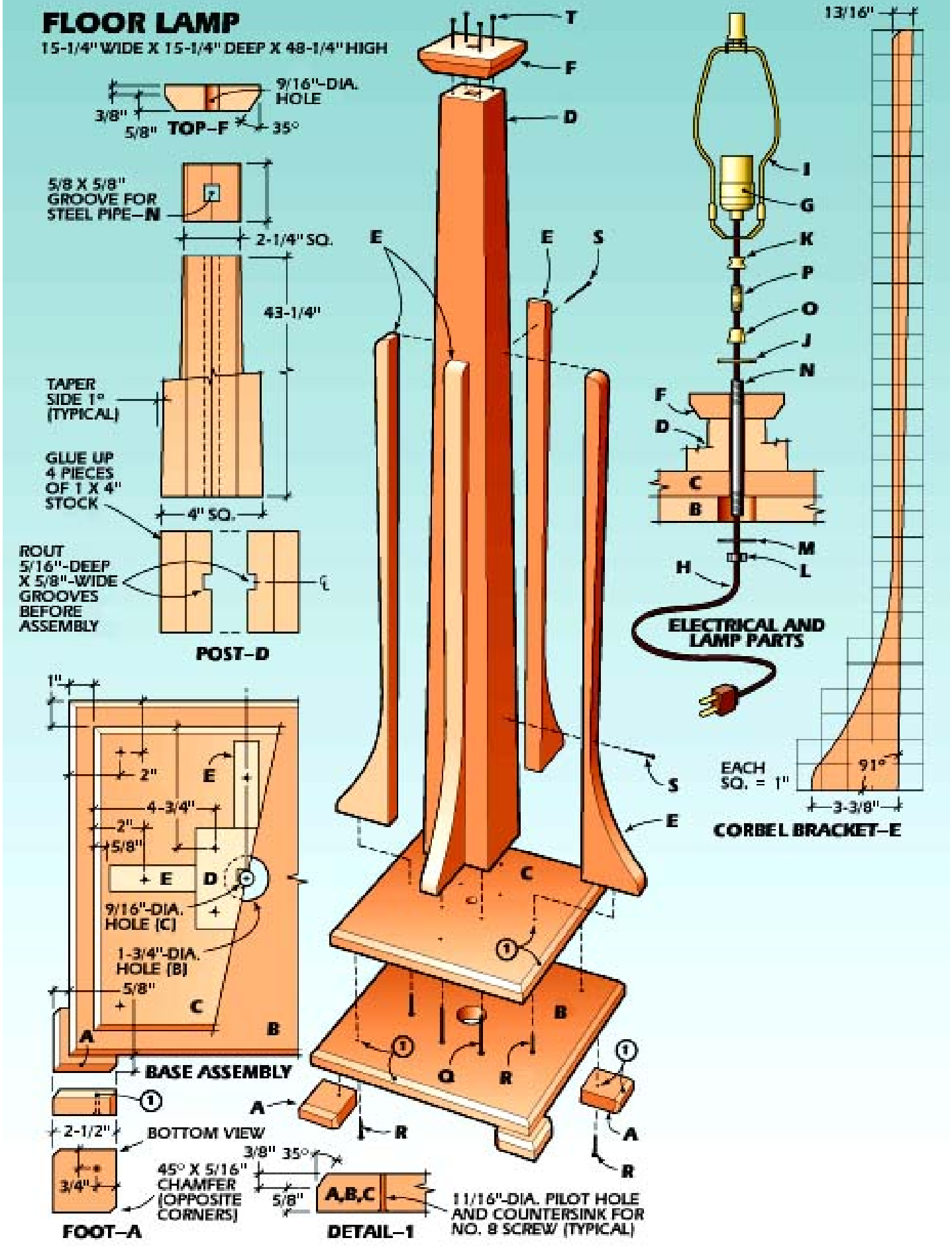
2. The corners are mitered and held secure with no.0 biscuits. Or, if preferred, you can use splines. Here, simply pass the miter faces through the table saw blade to a depth of about 3/4-in. and join the mitered corners using 1-1/2 in.-wide splines. If you opt for the latter technique, you may want to cut thin strips of molding to glue on the front edge to conceal the splined corners.

3. The back is of 1/4-in. cabinet grade plywood; install it using glue and 1-in. brads.

FLOOR LAMP

FLOOR LAMP

15-1/4" WIDE X 15-1/4" DEEP X 48-1/4" HIGH



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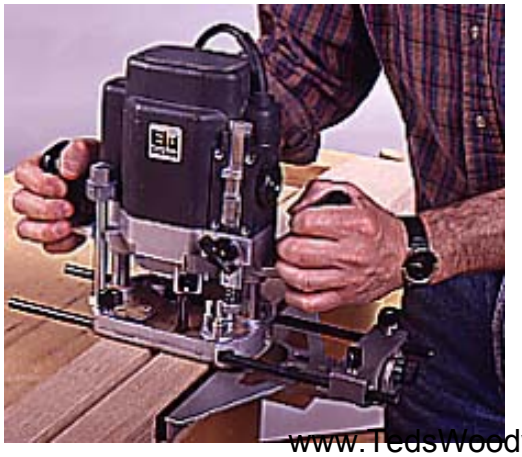
MATERIALS LIST—FLOOR LAMP		
Key	**No.**	**Size and description (use)**
A	**4**	**1 x 2 1/2 x 2 1/2" oak (foot)**
B	**1**	**1 x 14 x 14" oak (lower base)**
C	**1**	**1 x 12 x 12" oak (upper base)**
D	**1**	**4 x 4 x 43 1/4" oak (post)**
E	**4**	**1 x 4 x 30" oak (corbel bracket)**
F	**1**	**1 x 3 3/4 x 3 3/4" oak (top)**
G	**1**	**3-way-turn knob socket**
H	**1**	**10-ft. brown cord set**
I	**1**	**10" harp (size depends on shade)**
J	**1**	**1/4 IP x 1 1/2" brass check ring**
K	**1**	**1/4 IP x 7/16" tapped brass spindle**
L	**1**	**1/4 IP steel hexnut**
M	**1**	**1/4 IP x 1 1/2" steel washer**
N	**1**	**1/2" O.D. x 46" steel pipe with 1/4 IP threads on both ends**
O	**1**	**1/4 IP female x 1/8 IP female brass tapered coupling**
P	**1**	**1/8 IP x 1" steel nipple**
Q	**4**	**3" No. 8 fh screws**
R	**8**	**1 1/2" No. 8 fh screws**
S	**8**	**4d finishing nails**
T	**4**	**6d finishing nails**

Stock preparation

Begin by ripping the four post boards to size and crosscutting them 2 or 3 in. longer than the finished length. Spread glue on the mating surfaces of two of the boards, then clamp them together with their edges perfectly aligned. Repeat this process with the remaining two boards.



Set up the router with a 5/8-in. straight bit and an edge guide. Clamp one of the post halves between bench dogs, then rout a 5/16-in.-deep groove down the center of the blank (Photo 1). Repeat for the

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second post half. Then, crosscut each half of the post to finished length. Spread glue on the mating faces of the post halves, then clamp them together. Be sure to align the ends and edges of the post halves before setting the assembly aside.

Lay out the post taper on two opposite sides of the blank, then use a band saw to make the cuts (Photo 2). Remember to keep the saw kerf to the waste side of the layout lines. Next, clamp the post between bench dogs and use a sharp plane to remove the saw marks and bring the taper right to the layout lines. Transfer the tapered profile to the other two sides and repeat the procedure to finish shaping the post. Sand the surfaces smooth.

Cut the lamp top cap from a piece of 1-in.-thick stock, then use a table saw and miter gauge to cut a 35 degrees bevel on all sides (Photo 3). Next, bore a 9/16-in.-dia. hole through the center of this cap and sand the piece smooth. Then place the cap on top of the post, adjusting it for an even overhang on all edges. Bore pilot holes for 6d finish nails, then apply glue and nail the cap in place (Photo 4). Set the nails below the wood surface and fill the holes with a stainable wood filler.

Glue two oversized blanks together for the base panels. You can use joining plates to align the boards while gluing them. Just be sure to keep the plates far enough back from the finished ends of the panels so they will not be exposed when you make the final cuts. After the glue cures on the panels, rip and crosscut them to size. Make sure that both panels are perfectly square. Use a table saw to cut the bevels around the panel edges. Bore a 9/16-in.-dia. hole in the center of the upper panel, then bore and countersink pilot holes for fastening it to the post. Sand this panel smooth, then use 3-in. No. 8 fh screws and glue to fasten this panel to the post (Photo 5).

1--Rout a groove down the center for both halves of the lamp post. Use a 5/8-in.-dia. straight bit and a router edge guide.

2--Lay out the taper on opposite sides of the post. Then, cut off the waste with a band saw. Mark the other sides and cut them.

3--Cut the top cap to size, then use a table saw to cut a bevel on the bottom edge. Clamp the block to the miter gauge.

4--Bore a 9/16-in. hole through the top cap, then glue and nail the cap to the top of the post. Bore pilot holes for the nails.

Next, make a template for the corbel brackets from 1/4-in.-thick plywood or hardboard. After cutting out your template, hold it in place against the lamp post and base. Once you are satisfied with the fit, use it to trace the shape onto oversized blanks for the actual brackets. Clamp a blank between bench dogs, with the bracket outline overhanging the bench. Then, use a sabre saw to make the cut (Photo 6). Repeat the same process for each bracket. Sand all the brackets.

5--Cut the upper base to size and bore a 9/16-in. hole through its centerpoint. Attach it with glue and screws.

6--Lay out the corbel shapes on a board. Then clamp the stock between bench dogs and cut the outline with a sabre saw.

Assembly

Place small guide marks on the post and base to indicate the locations of each bracket. Then apply glue to the back and bottom edges of each bracket and use 4d finish nails to pin them to the post (Photo 7), making sure to bore pilot holes and set the nailheads. Then bore and countersink pilot holes and drive one 1 1/2-in. No. 8 fh screw through the base into the bottom end of each bracket.

Cut the feet to size and shape, then bore and countersink pilot holes for attaching them to the lower base. Set the feet aside and bore a 1 3/4-in.-dia. hole through the

7--Attach the corbel brackets to the post sides with glue and nails. Attach them to the base with screws driven from below.

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center of the lower base panel. Then, bore and countersink pilot holes for fastening this panel to the upper base panel. Sand the panel smooth, mark the location of each base foot, then apply glue to the joints and fasten the feet with screws.

Clamp the lamp post upside down in the bench vise, then spread glue and position the lower base panel over the upper base panel. Adjust the parts for equal overhang on all edges. Then temporarily clamp them together and fasten the parts together with screws (Photo 8).

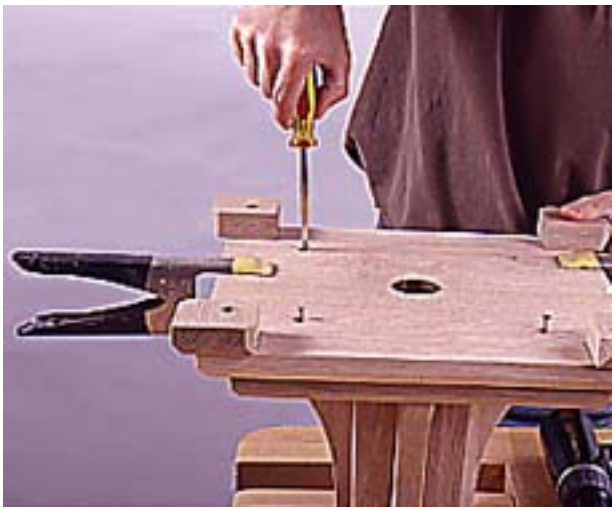
Installing lamp parts

Next, lay the lamp post on a padded table and slide the threaded steel pipe into the base hole (Photo 9). Before pushing the pipe all the way into the base, slip a washer over the end and thread on the steel nut. You can adjust how much the pipe protrudes past the top of the hole by tightening or loosening the nut. The pipe should extend about 3/8 in. beyond the top cap.

Place the brass check ring over the top end of the tubing, then thread on the tapered brass coupling. This fitting makes the transition between the 1/4 IP thread of the long pipe and the 1/8 IP thread of the steel nipple that connects the lamp fixtures. Next, thread the 1-in.-long steel nipple into the top end of the coupling. Allow this nipple to extend out of the coupling by about 3/4 in. Then place the tapped brass spindle over the nipple and tighten it against the coupling (Photo 10). The spindle will lock the nipple in place.

Push the lamp cord through the bottom of the steel pipe until it extends out the top of the nipple by about 3 in. Then feed the cord through the socket base and thread the base onto the nipple until it bottoms out on the harp bracket. Tighten the lockscrew on the base.

Connect the lamp cord to the terminals on the socket (Photo 11), and push the excess cord back down through the post so that the socket can sit firmly on its base.



8--Cut the feet and lower base to size. Then attach the feet-and join the two base pieces-with glue and screws.

9--Install a washer and nut on one end of the steel pipe, then slide it into the post's hole. Adjust the height by turning the nut.

10--Slide the brass check ring over the steel pipe. Then thread on the tapered coupling, steel nipple and brass spindle.

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Then, snap the socket cover in place by pushing it down until you hear a click. Install the harp by compressing it and slipping each end into its bracket. Then, slide a locking ring over each bracket.

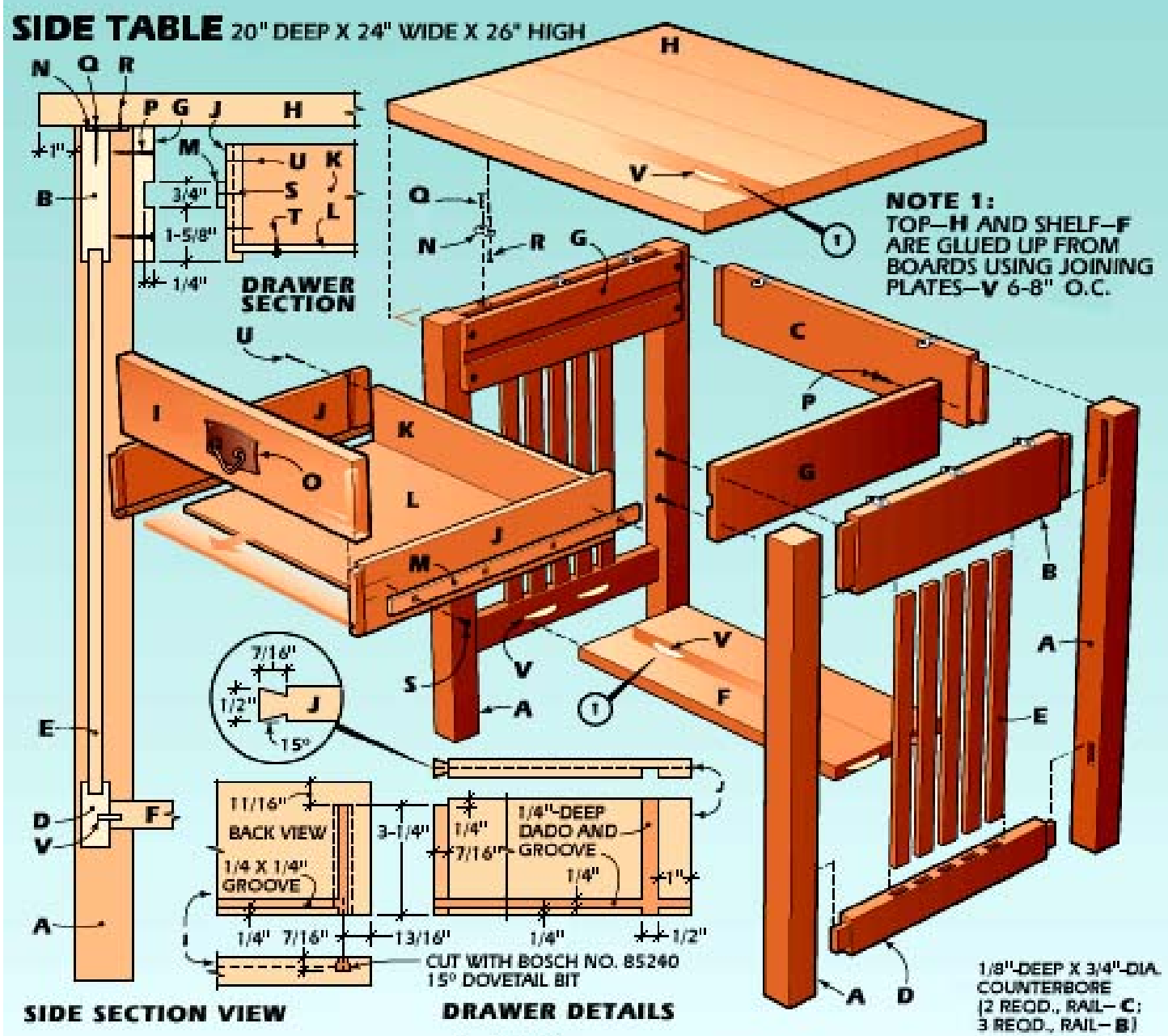
Before staining the lamp, apply masking tape to the parts for protection during the finishing process. Apply stain and finish, using the techniques described in "Rocking Chair." Once the finish has cured, remove the masking tape and install a bulb and lampshade. Our shade came unfinished, so we could match the finish on the rest of the piece (Photo 12).

11--Slide the lamp cord through the pipe and thread the socket onto the nipple. Attach the wires to the socket screws.

12--The lampshade comes unfinished. Remove the glass panels, then stain and apply a finish to match the lamp base.

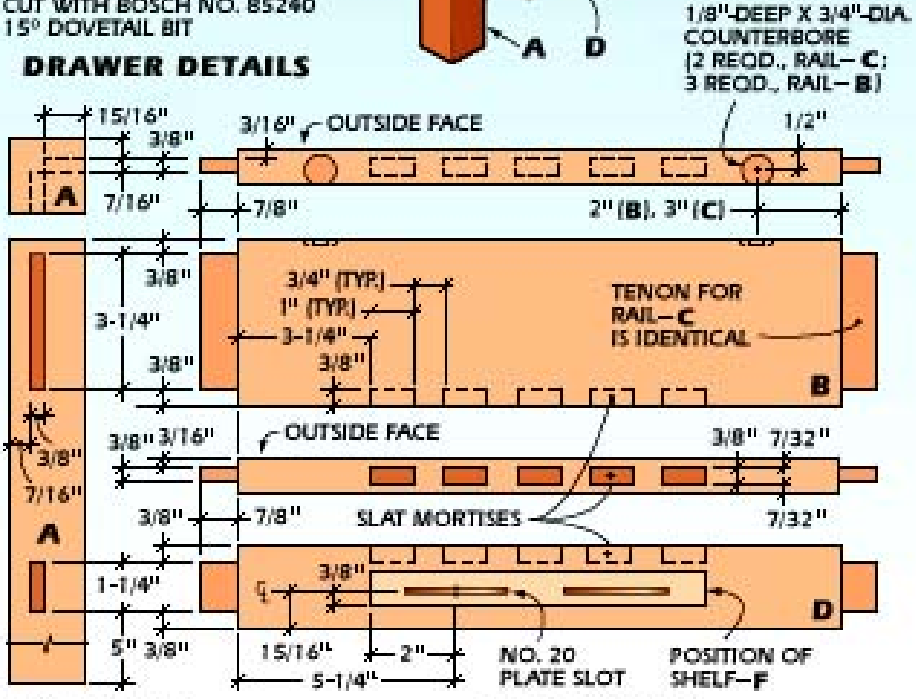
SIDE TABLE

SIDE TABLE 20" DEEP X 24" WIDE X 26" HIGH



SIDE SECTION VIEW

DRAWER DETAILS



LEG DETAIL

RAIL DETAILS

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Stock preparation

Like the rocker and bookcase, the material used in this table is quarter- sawn white oak. The legs are cut from 8/4 solid stock, the top from 5/4 material and the rest from 4/4 lumber. For the drawer sides, you will have to either plane 4/4 stock to 1/2-in. thickness or have your lumber dealer plane the lumber to the finished size. The same holds true for the drawer guides, which are 5/8 in. thick.

The panels for the bottom shelf and tabletop are glued up from narrow boards. Cut stock slightly longer and a bit wider than required to yield the finished panel. Edge-joint each piece, then lay out the locations of the No. 20 joining plate slots every 6 to 8 in. along the mating edges. Keep the end slots about 3 in. from the finished ends of the panels.

Use the plate joiner to cut the slots, registering the cuts against a flat work surface. Then apply glue to the slots, plates and edges and assemble the panels. Use clamps to pull the joints tight, then let the glue set for about 20 minutes. After the glue fully cures, rip and crosscut the panels to finished dimension.

Joinery

Rip and crosscut the remaining parts for the table base to finished dimension. Then, lay out the mortise in the table legs. Use a router with an edge guide and 1/2-in.-dia. up-cut spiral bit to make these cuts (Photo 1). Use a sharp chisel to square the ends of each mortise (Photo 2).

Use a dado blade in your table saw to cut the tenons on the side and back rails. Since the tenons are 7/8 in. long, you will have to make two passes for each tenon cheek. Readjust the blade height to cut the shoulders at the top and bottom edges of the tenons (Photo 3). Check the fit of each tenon in its matching mortise.

Mark the locations of the slat mortises in the side rails. Clamp a tall fence to the drill-press table to help locate the rails,

1--Use a router with an up-cut spiral bit and an edge guide to cut the rail mortises in the table legs. Make several passes.

2--When the routing is done, carefully square the ends and flatten the sides of each mortise with a sharp chisel.

3--Use a dado blade in a table saw to cut the rail tenons. First cut the cheeks, then readjust the saw to cut the shoulders.

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then bore overlapping 3/8-in.-dia. holes to remove most of the waste (Photo 4). Complete the mortises by smoothing the walls and squaring the ends with a sharp chisel.

4--Cut the slat mortises in the rails using a drill press to remove most of the waste and a sharp chisel to finish the cuts.

Lay out the joining plate slots on the bottom shelf and side rails. Use the plate joiner to cut the slots in the shelf ends, registering the cut on a flat workbench or on the top of your table saw (Photo 5). To cut the slots in the side rails, you must use a spacer block under the plate joiner to yield the proper slot position (Photo 6).

Before beginning to assemble the base, sand all the parts with 120- and 220-grit sandpaper, then dust off the pieces thoroughly. It is much easier to do a good job of sanding at this stage than it is once the base is together.

5--Clamp the bottom shelf securely to a workbench. Then use a plate joiner to cut joining slots in both ends of the shelf.

Base assembly

Position the side slats in their mortises in one bottom side rail (Photo 7). If the parts fit properly, you need not apply glue to these joints, since the slats will be held captive between the rails. Place the top side rail over the slat ends, then clamp the assembly temporarily to be sure that the slats are completely seated in the mortises.

Apply glue to the rail tenons and leg mortises, then assemble the table side. Clamp the joints tight, then compare opposite diagonal measurements to be sure that the assembly is square (Photo 8).

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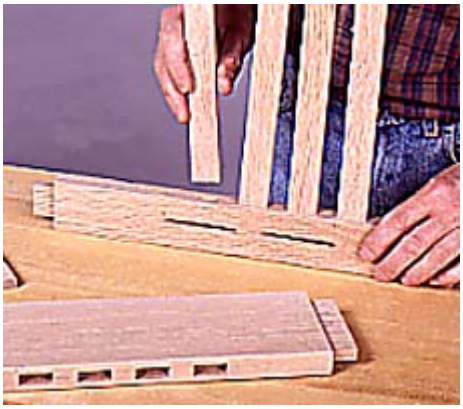
6--Clamp the bottom rails to your table

Follow the same procedure for the other side. Apply glue to the joining plate slots, mortises, tenons and plates for assembling the shelf and back rail to the sides. Join the rail and shelf to one side (Photo 9), then place the opposite side over the shelf and rail ends. Stand the base on a flat work surface and clamp the joints tight (Photo 10). Check for square.

Use a router with an edge guide to cut a 1/4-in.-deep x 3/4-in.-wide dado in each drawer guide (Photo 11). Bore and countersink pilot holes for mounting screws in the guides, then sand the guides with 220-grit sandpaper before fastening them to the table legs (Photo 12).

saw fence. Then use a plate joiner to cut joining slots in one side of both rails.



7--Test fit the side slats in the rail mortises. Sand or trim the joints, if necessary, to achieve a tight fit for each slat.

8--Apply glue to the mortises and tenons, then clamp the parts. Check for square by comparing diagonal measurements.

9--To join the sides to the back rail and bottom shelf, apply glue to the slots and plates, and to the mortises and tenons.

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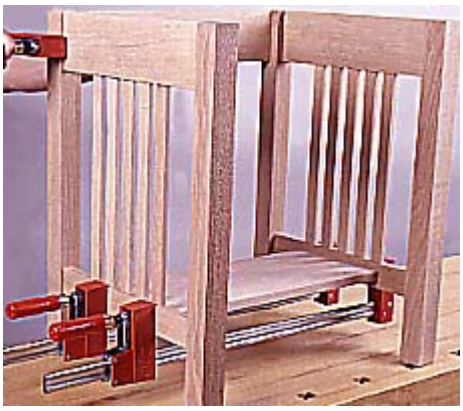

10--Clamp the side assemblies to the back rail and shelf and check the parts for square. Readjust the clamps if necessary.

Mark the locations of the tabletop fasteners on the top edge of the side and back rails. Use a 3/4-in. Forstner or multispur bit to bore the 1/8-in.-deep recess for the fasteners. Bore a pilot hole for each, then attach the fasteners with 1-in.-long No. 8 fh screws.

Drawers

Cut stock to finished size for the drawer sides and back, and rip stock for the drawer face, but don't cut it to length yet. Instead, leave the drawer face blank about 12 in. long. The drawer sides are joined to the face with sliding dovetails. These joints are not difficult to cut, and they provide a nice compromise when you do not want to invest the time required for traditional dovetail corner joints. In order to cut these stopped dovetail slots, construct a U-shaped jig to guide the router. You can build this jig by screwing together three strips of scrap lumber or plywood. The dimensions of these pieces are not critical. But it is important that the three pieces are assembled square to each other.

Set the dovetail bit–we used a Bosch No. 85240–to cut 7/16 in. deep, then make an indexing cut into the fence of your jig to make locating your cut easy. Mark the position of the two slots–along with an end mark for each slot–on the inside surface of the drawer face, centered on the length of the face blank. Clamp the face to the routing jig with the indexing cut centered

13--Rout slots in the drawer face for the drawer sides with a dovetail bit. Use a square U-shaped jig to guide the router.

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14--Use the same dovetail bit in a router

on one mark. Slide the router bit into the slot, turn on the motor and guide the tool along the jig to the end mark of the slot (Photo 13). Turn off the router and slide the bit back to the indexing cut to remove it. Repeat for the other slot. Cut the face to finished length.

Use the same dovetail bit in the router table to cut the dovetail shape on the ends of the drawer sides (Photo 14). For the joint with the drawer back, use a dado blade in the table saw to cut a simple dado. Then use a 1/4-in.-dia. straight bit in the router, and an edge guide, to cut the grooves for the drawer bottom in the face and drawer sides (Photo 15). Note that the groove in the face runs only between the dovetail slots.

Use a small backsaw to cut the shoulder at the top of the dovetail on each drawer side. Then dry assemble the drawer box to be sure that all joints fit properly. If all the joints are correct, sand all drawer parts, then apply glue and reassemble the drawer (Photo 16). Use brads to reinforce the glue joints between the back and drawer sides. Then clamp the drawer parts together. Check that the assembly is square.

Cut the drawer bottom from 1/4-in.-thick plywood, then slide it into place, and fasten it to the bottom edge of the drawer back with screws. You can remove the bottom later to make finishing the drawer easier.

Cut the drawer hanger strips to size, then bore and countersink pilot holes for attaching them to the drawer sides. Clamp the strips to the drawer sides, then fasten them with screws (Photo 17). Finish the drawer assembly by marking the locations of mounting screws for the drawer pull. Bore pilot holes and attach the pull.

table to cut both sides of the dovetails on the ends of each drawer side.

15--Cut a dado between the dovetail slots on the drawer face for the bottom panel. Cut matching dadoes in the drawer sides.

16--Apply glue to all the drawer joints, then clamp the box together. Reinforce the side-to-back joints with brads.

17--Slide the drawer bottom in place and attach it to the back with screws. Also, screw the guide strips to the sides.

18--Center the base over the top and mark the fastener holes. Then bore pilot holes in the top and attach the base.

Assembly

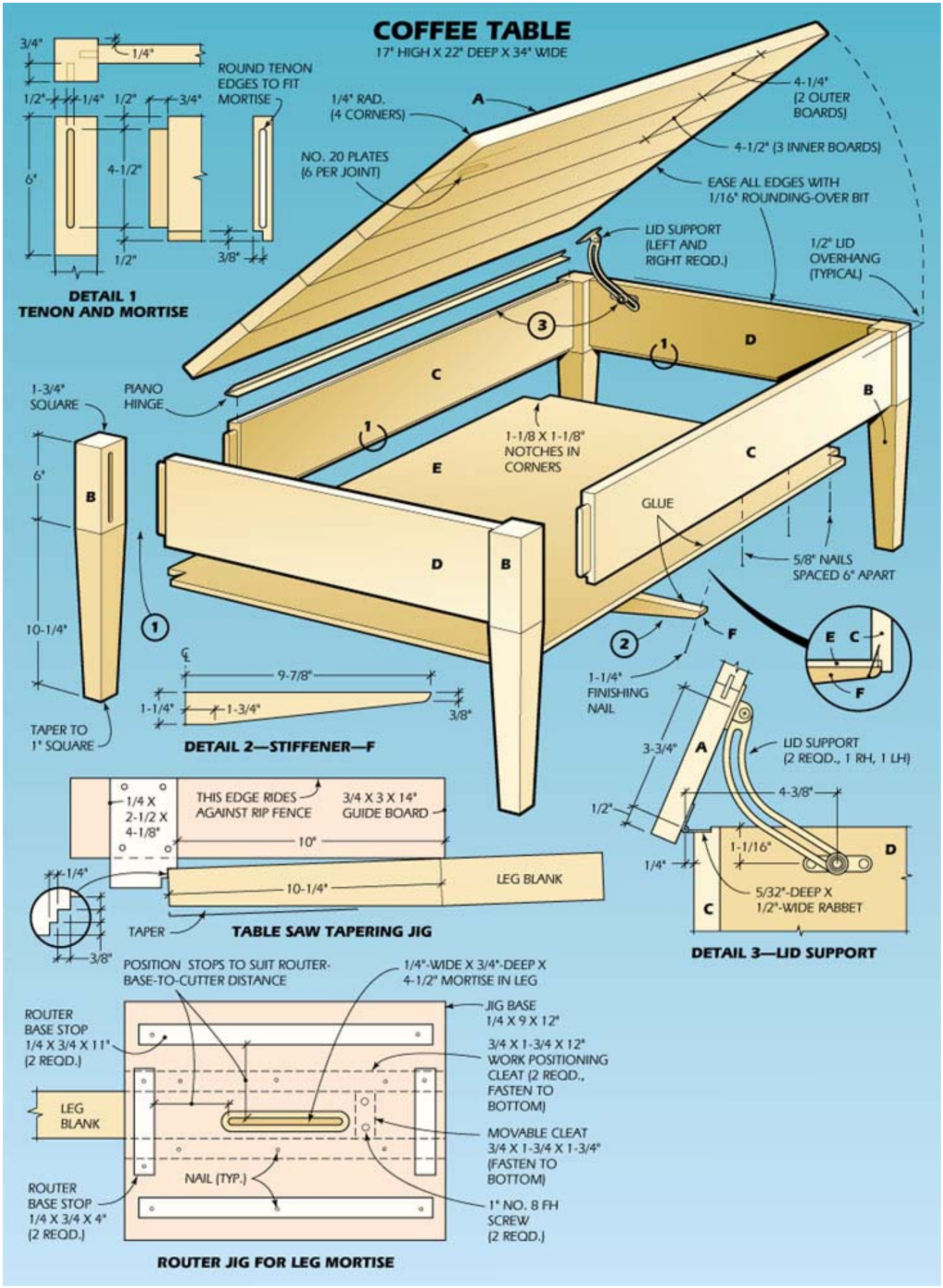
Sand the tabletop smooth with 220-grit sandpaper, then place it upside down on a padded surface. Invert the base on the top and adjust it for an even reveal on all sides. Next, mark the locations of the screwholes for the tabletop fasteners (Photo 18). Use a clamp to maintain the proper spacing between the front table legs.

Remove the base from the top and bore pilot holes for the tabletop fastener screws. Then, replace the base and install the screws. You'll need a screwdriver with a magnetic tip to start the screws between the drawer guides and side rails. Apply the same stain and finish that's described in "Rocking Chair."

MATERIALS LIST–SIDE TABLE

Key	No.	Size and description (use)
A	4	1 3/4 x 1 3/4 x 25" oak (leg)
B	2	13/16 x 4 x16 1/4" oak (rail)
C	1	13/16 x 4 x 20 1/4" oak (rail)
D	2	13/16 x 2 x 16 1/4" oak (rail)
E	10	3/8 x 1 x 15 1/8" oak (slat)
F	1	13/16 x 8 x 19 7/8" oak (shelf)
G	2	5/8 x 4 x 15 7/8" oak (drawer guide)
H	1	1 x 20 x 24" oak (top)
I	1	13/16 x 3 15/16 x 18 3/8" oak (drawer face)
J	2	1/2 x 3 1/2 x 16 1/4" oak (drawer side)
K	1	1/2 x 3 x 16 3/4" oak (drawer back)
L	1	1/4 x 15 1/16 x 16 3/4" oak plywood (drawer bottom)
M	2	1/4 x 3/4 x 15 13/16" oak (drawer guide strip)
N	8	Knape & Vogt No. 1547STL tabletop fastener
O	1	Whitechapel No. 106STH2 drawer pull
P	8	1 1/4" No. 8 fh screws
Q	8	1" No. 8 fh screws
R	8	5/8" No. 8 fh screws
S	8	1/2" No. 6 fh screws
T	3	5/8" No. 6 rh screws
U	8	3/4" x 16-ga. brads
V	16	No. 20 joining plates

COFFEE TABLE



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MATERIALS LIST—COFFEE TABLE		
Key	**No.**	**Size and description (use)**
A	1	3/4 x 22 x 34" maple (lid)
B	4	1 3/4 x 1 3/4 x 16 1/8" maple (leg)
C	2	3/4 x 5 1/2 x 31" maple (apron)
D	2	3/4 x 5 1/2 x 19" maple (apron)
E	1	1/4 x 19 3/4 x 31 3/4" lauan plywood (bottom)
F	1	3/4 x 1 1/4 x 19 3/4" maple (stiffener)
Misc: Curved friction lid supports, Part Nos. 25619 and 25627, brass 1 1/2-in.-wide x 48-in.-long piano hinge,		

The Top And Legs

The panel for the tabletop is assembled by edge gluing five boards. Begin construction by ripping and crosscutting the stock slightly oversize, 4 1/2 in. wide x 35 in. long.

If you have a plate joiner, use it to cut the slots for six joining plates for each edge joint. Arrange the boards to produce the most attractive grain pattern. And make sure the endgrain growth ring directions alternate between the boards.

Mark centerlines for the slot positions along each joint line, then clamp each board to a flat benchtop while the slots are cut (Photo 1).

1--Joint the edges of the boards for the tabletop and cut the slots in them to receive the joining plates.

Inserting the plates and applying and evenly spreading the glue on eight edges can be difficult to do before the glue begins to set. To make the job easier, preglue the plates in each board. Use a small-nozzle squeeze bottle to apply glue in the slots without getting any on the edges (Photo 2).

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2--Save glue application time by pregluing

To assemble the panel, you'll need four or five long clamps, six smaller clamps and six cauls. This arrangement will apply even pressure across the panel to prevent it from cupping. Rub paste wax on each caul's contact surface to prevent it from sticking to the boards.

Apply glue to the edges and plates, slide the boards together, then apply pressure to the cauls and the long clamps (Photo 3).

Remove the hardened glue that has squeezed from the joint using a scraper, belt sander and finishing sander, in that order. Next, crosscut the panel to finished size.

Rip and crosscut the legs to size and joint their four faces so they are square to one another and smooth. Lay out the mortise positions on adjacent faces and install a 1/4-in.-dia. straight bit in your plunge router for cutting the mortises. You can use a router edge guide to make the cuts, but the simple jig shown enables you to do the job more quickly and easily. The jig is made of 1/4-in. plywood with cleats attached to the bottom to secure the leg. A removable end cleat allows the leg to be repositioned so that one jig can be used to cut the mortises on both leg faces. On top of the jig, four strips guide the router and stop its travel.

Make mortise cuts in several passes (Photo 4). When the first mortise has been cut on each leg, reposition the jig's end cleat, insert the blank from the other end and proceed to cut the mortise on the adjacent face.

The tapers are cut on the table saw with the aid of a simple step jig. The taper is cut on two adjacent faces with the leg positioned in the first step of the jig. The end of the leg is placed in the second step to cut the two remaining tapers (Photo 5).

the joining plates in their slots. A small-nozzle bottle is handy here.

3--Glue and clamp the top using cauls above and below. Wax the cauls to prevent glue from sticking to them.

4--Use a jig and a plunge router to cut the leg mortises. The stops are positioned to suit the router's base.

5--Use a stepped jig on the table saw to cut the leg tapers. Each step positions the leg to cut two tapers.

Smooth the inner leg surfaces using a sander, but sand the mortised faces gently by hand to avoid distorting the surface surrounding the mortise. The mortise surface has to remain flat and square.

To complete the legs, set up a 1/16-in.-rad. rounding-over bit in a router table and round the corners (Photo 6).

Aprons And Assembly

Rip and crosscut the aprons, then set up a dado blade on the table saw to cut the apron tenons. Clamp a stop-block to the miter gauge fence, elevate the blade for a 1/2-in.-deep cut, and cut the tenon in four passes (Photo 7). Next, cut the rabbets for the bottom panel on the inside edges of the four aprons.

After using a chisel to round the ends of the tenons to match the mortises, the table is ready for assembly. Use four clamps and four cauls to assemble the legs and aprons (Photo 8). Apply glue sparingly to the tenons, and draw the assembly together. Check the assembly for square. If necessary, adjust the clamps to make the assembly square.

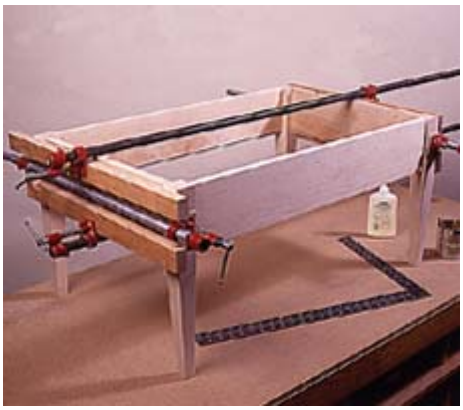
After the glue has set, use the router with a straight bit to cut the hinge rabbet. To do this, clamp two pieces of scrap flush with the apron's top edge to provide a stable surface for the router. Set the router to make a 5/32-in.-deep cut (Photo 9). Note that the rabbet's 1/2-in. width is critical. It positions the hinge so the top can tilt without striking the leg's corner.

Next, crosscut the piano hinge to fit the rabbet and install it temporarily. Do this by placing the lid on the workbench with the bottom facing up. Then place the table, bottom up, onto the lid and mark the position of the hinge on the lid. Remove the hinge, mark the screw centers, and bore the screw pilot holes. Attach the hinge to the table first, then to the lid.

Once the hinge is installed, mark and bore the screw pilot holes for lid supports. Attach the supports to the aprons first,

6--Round the bottom of the leg corners on the router table. Don't round the top of the leg where it abuts the apron.

7--Use a stopblock clamped to the miter gauge and a dado blade in the table saw to cut the apron tenons.



8--Glue and clamp the aprons and legs. Heavy cauls distribute clamping pressure across each apron.

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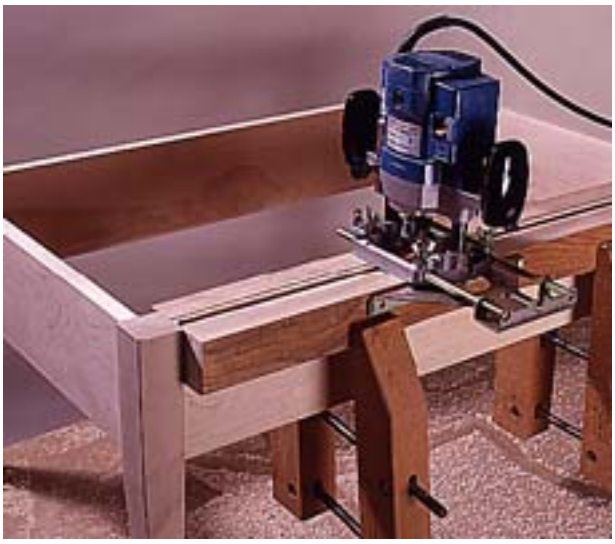
then the lid (Photo 10).

Cut the plywood bottom to size and install it with glue and nails. Also, glue the stiffener strip to the bottom. Remove the lid to allow finishing.

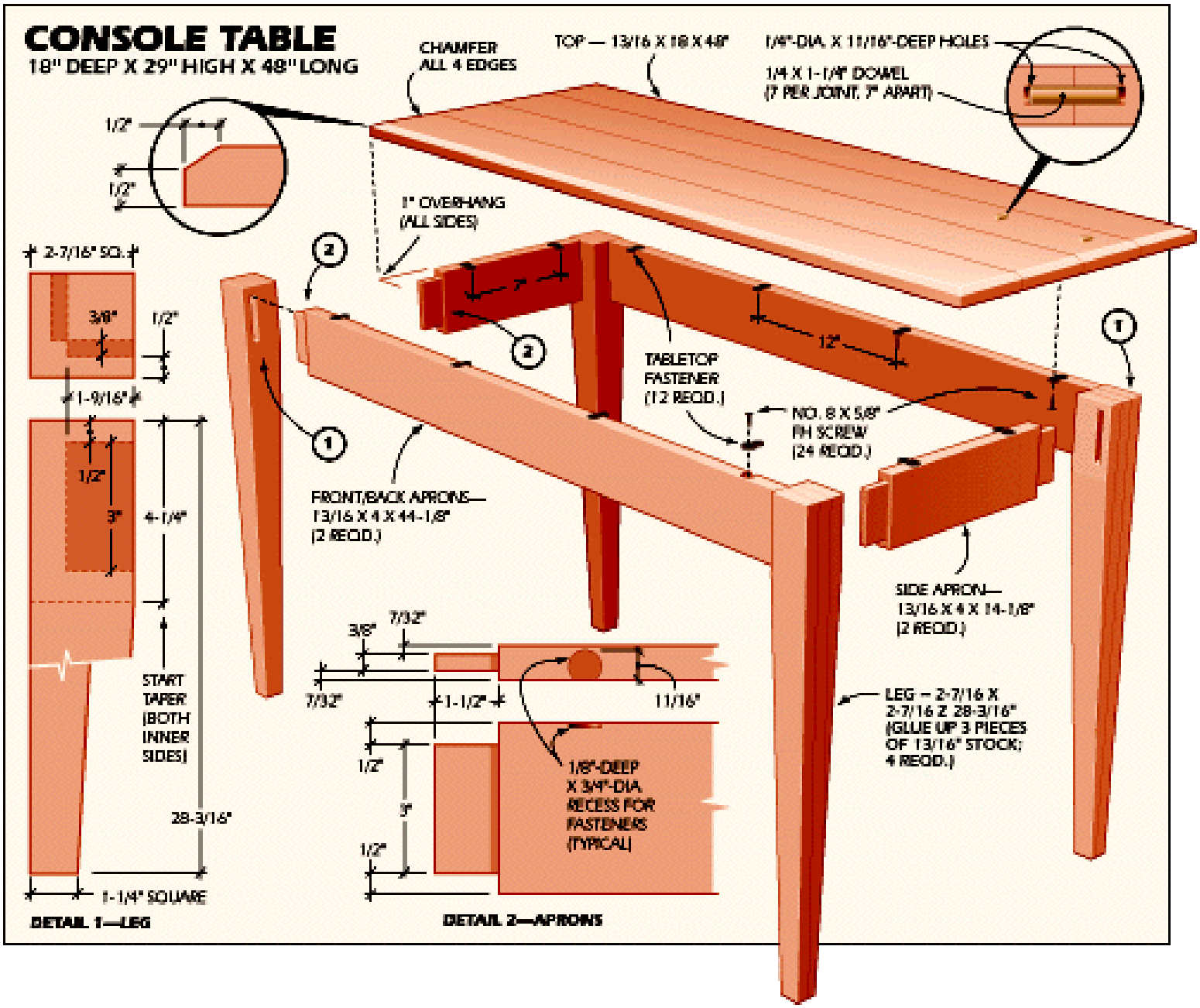
We finished the table with three coats of polyurethane lightly tinted with a few drops of yellow ochre to give it a warm honey color.



9--Clamp scrap to the rear apron to provide a base for the router, then cut the hinge rabbet using a straight bit.

10--Sequence is important when attaching the top's support hardware. Attach it to the apron first, then the top.

CONSOLE TABLE



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This simple console table is a great beginner's project. Its straightforward lines are reminiscent of Shaker pieces built over 100 years ago. But simple doesn't have to mean unsophisticated. This solid cherry piece is well-tailored, crisply built and can fit just about anywhere: your front hall, behind a living room sofa, in an upstairs bedroom, or even in your bathroom if it's blessed with enough extra space.

But good design isn't the whole story. This piece is also easy for a beginner to build. It has only nine parts: four legs, four rails and a top. And we show you how to build it with nothing more than hand tools and a few portable power tools. Everything you need is described in "Beginner's Toolbox".

Perhaps the best part of this design, however, is that it puts to good use everything that comes before it in this Woodworking Guide. If you start this table now, your gratification won't be delayed much longer. You should be able to finish it up in just a few weeks of spare time–even if you just learned how to sharpen a chisel or cut a mortise-and-tenon joint.

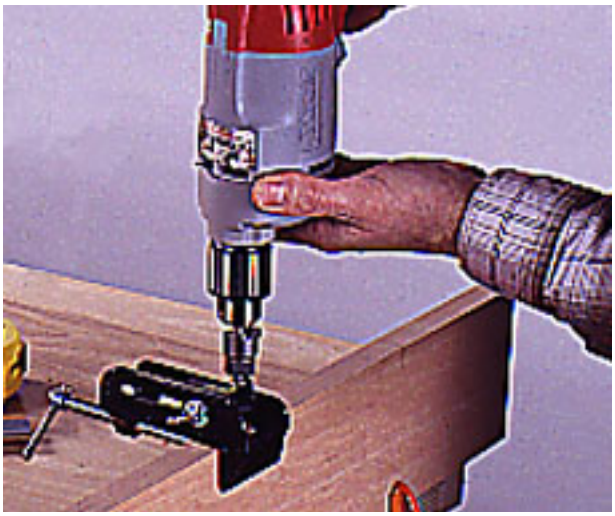
Cherry Stock

The material we used for this piece is solid cherry stock that we bought flattened on both sides and jointed on one edge. You'll have to pay more for this service, but it's worth the cost. The standard thickness for this type of hardwood is 13/16 in.

The first step in preparing the lumber is to crosscut all parts to rough length, a couple of inches longer than their finished lengths. Then check the jointed edge of each piece for flatness and square. If some refinements are required, clamp the board to the side of your worktable and use a bench plane to true the edge (Photo 1). Next, cut the boards to finished width using a circular saw with a rip guide (Photo 2). Clean up any saw marks with a bench plane.

1--Begin the top by flattening one edge of each board, using a bench plane. Make sure the edge is planed square to the face.

2--Cut each top board to width using a circular saw and rip guide. Make sure the rip guide follows the planed edge.



3--Lay out the location of the alignment dowels on the board edges. Then use a doweling jig and drill to bore the holes.

4--Cover the edges and dowel holes with glue, insert the dowels and bring the boards together with pipe clamps.

Tabletop

This tabletop was made from four smaller boards that were glued together. Using multiple boards helps keep the top flat over time. If your stock is wide enough to use only three boards, that's fine. Begin work by laying the boards on a flat surface and choosing the most attractive grain pattern by arranging the boards in several ways. Then lay out the dowel locations on all the joints and bore the dowel holes using a doweling jig and a portable drill (Photo 3).

Next, place a drop of glue in each dowel hole and gently tap the dowel in place. Then spread the glue evenly on all the mating edges and push the boards together. Tighten the joints, using pipe clamps (Photo 4), and check that the panel is flat before letting the glue set. If it's not, readjust the clamps until the surface is flat. After 20 minutes scrape off any excess glue from the joints and let the panel dry overnight.

5--When the glue is dry remove any squeeze-out, then let the assembly cure. Flatten joints if necessary with a plane.

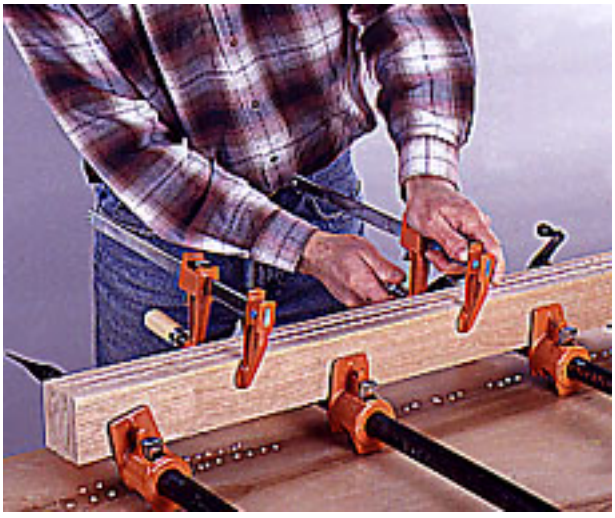
When you remove the clamps, check the panel surface carefully. If the joints are flush, set the panel aside. If they aren't, use a bench plane to smooth the surface (Photo 5). Hold the plane at a 30 degrees angle to the wood grain and make shearing cuts.

6--Mark the finished length on both ends of the top panel. Then make the cuts with a saw and straightedge guide.

Next, cut the panel to finished length, using a circular saw and a straightedge guide (Photo 6). Make sure that both ends are square to the sides before making the cuts. Next, mark guidelines for the edge chamfer around the perimeter of the top and use a block plane to create these bevels (Photo 7). Be sure to clamp a scrap block to each long edge to keep them from splitting when you're working on the end grain.

Complete the tabletop by sanding smooth both sides and all the edges. Begin with 120-grit paper and move through a sequence of 150-, 180- and 220-grits.

7--Mark the chamfer around the top and plane the edges to this line. A scrap block keeps the side edge from splitting.



8--Cut the leg stock to size, then apply glue to the mating surfaces. Keep the board edges flush when clamping.

Legs And Rails

Crosscut the leg stock to finished length. Note that each leg is formed from three pieces of stock that are glued together. Apply glue to the three boards that make up each leg and clamp them together (Photo 8). Scrape off the excess glue after 20 minutes, and leave each leg assembly clamped for at least an hour. Don't do any further work on these pieces until the glue has cured for 24 hours.

Lay out the mortises on the corresponding

9--Lay out the tenons on the ends of the table rails with a marking gauge. Keep the

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legs with a marking gauge. Then use a doweling jig and a portable drill to remove most of the waste (Photo 12). Finish up the mortise by squaring the ends and sides with a sharp chisel.

Once the joinery is done, cut the tapers on both inside edges of each leg, as shown in the drawing below. Use a circular saw and be sure to cut on the waste side of the layout lines. Finish these tapers with a bench plane (Photo 13), making sure to check for square as you work. Before the legs and rails are assembled, it's a good idea to finish sand all the parts with the same progression of grits that was discussed earlier.

gauge base flat on the board surface.

10--Make the cheek cuts on the tenons using a backsaw. Keep the blade kerf just to the waste side of the layout lines.

11--Make the tenon shoulder cuts with a backsaw. Clamp a scrap block to the board to help guide the saw blade.

12--Remove the waste from the mortise using a drill and doweling jig. Square the ends and walls with a sharp chisel.

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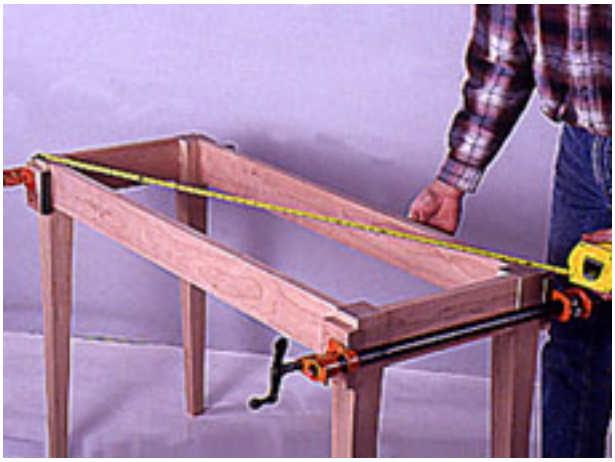
Assembly

Begin by joining a long rail to a pair of legs. Spread the glue evenly on the tenons and mortises, and then clamp the pieces together. Do the same with the other legs and long rail. When the glue has cured on these two assemblies, join them together with the short rails. Assemble the parts on a flat surface. Once the clamps are in place, compare opposite diagonal measurements to check for square (Photo 14). If the assembly isn't square, readjust the clamps until it is.

When the base joints have cured, lay out and bore the holes in the rails for the tabletop fasteners. Then turn the top upside down on a padded table and place the inverted base assembly on the underside of the top. Adjust the base so it's centered on the top. Then mark the location of the fastener holes. Bore pilot holes and screw the base to the top (Photo 15).

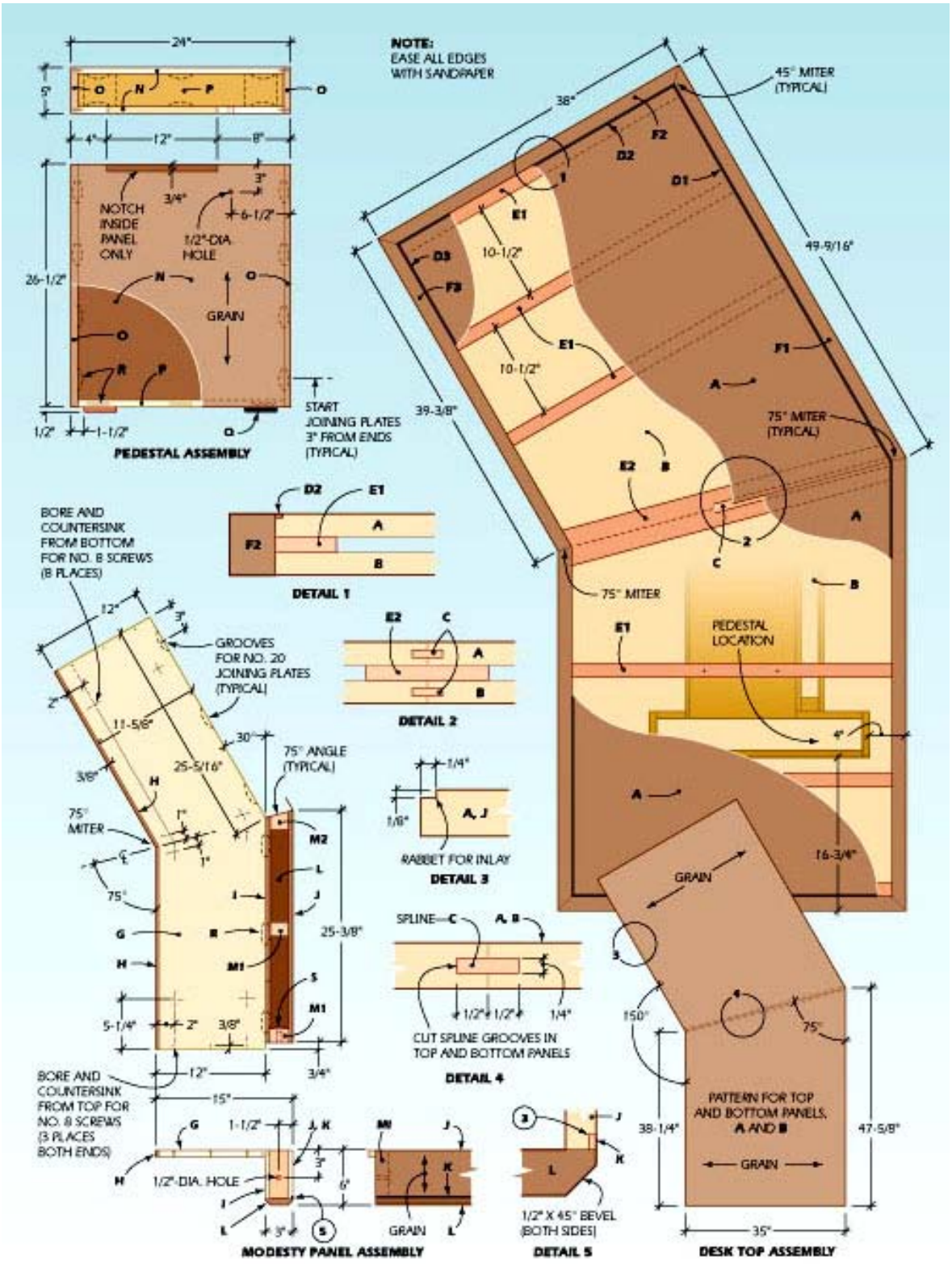
13--Rough cut the leg tapers with a circular saw. Then reduce the edges to finished thickness with a bench plane.



14--Glue and clamp the legs to the rails. Then check for a square assembly by comparing diagonal measurements.

15--Attach the tabletop fasteners to the rails. Then turn the table parts over and screw the fasteners to the underside of the top.

OFFICE DESK



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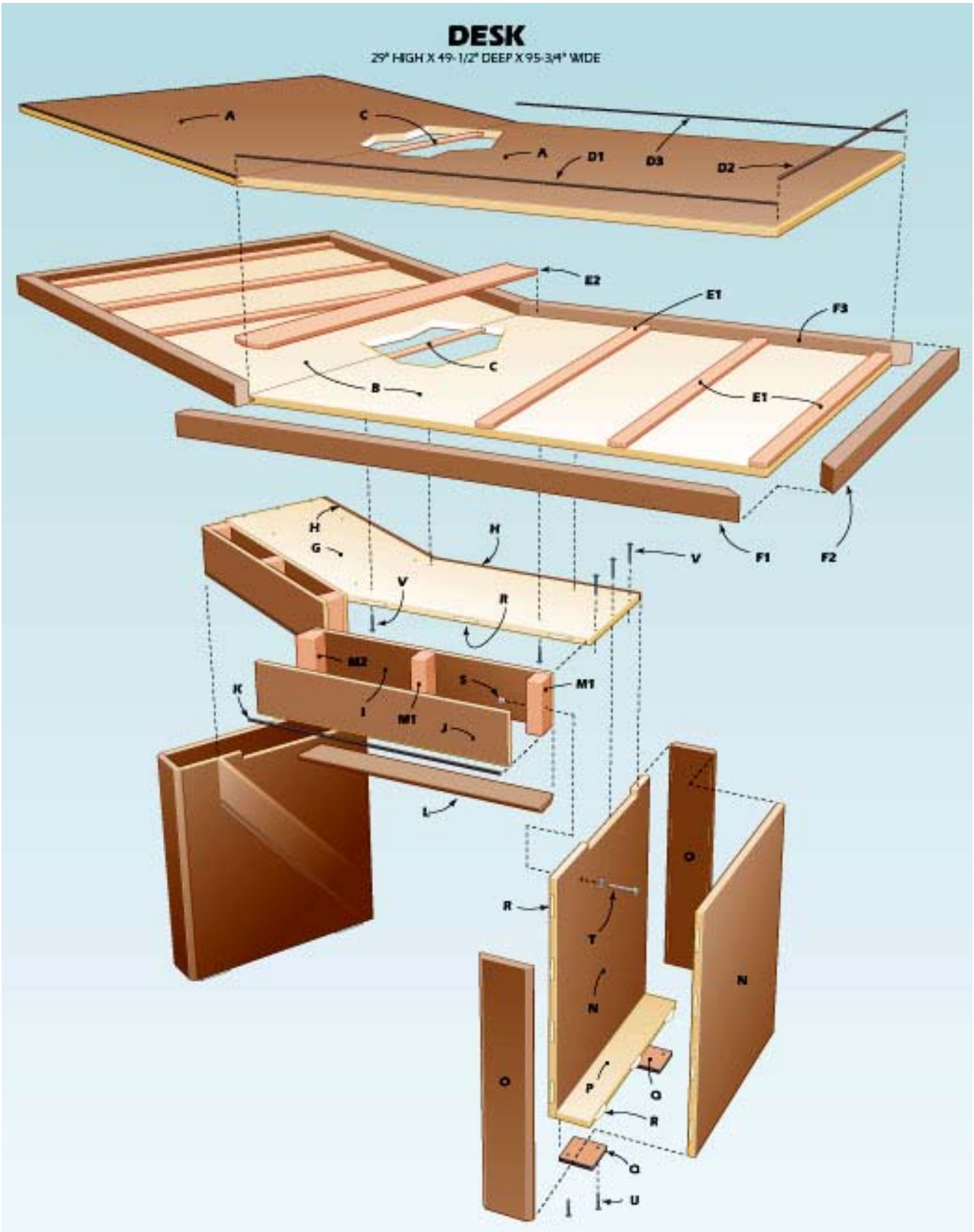
DESK
29" HIGH X 49-1/2" DEEP X 95-3/4" WIDE
A
C
A
D1
D3
D2
E2
E1
F3
C
B
E1
H
G
H
V
F1
F2
V
R
M2
S
M1
K
I
M1
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L
O
R
T
N
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P
Q
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U

MATERIALS LIST–OFFICE DESK

Key	No.	Size and description (use)
A	2	3/4 X 35 X 47-5/8" walnut panel stock* (upper top)
B	2	3/4 X 35 X 47-5/8" panel stock** (lower top)
C	2	1/4 X 1 X 36-3/8" maple (spline)
D1	2	1/8 X 1/4 X 47-5/8" maple† (inlay)
D2	2	1/8 X 1/4 X 35" maple† (inlay)
D3	2	1/8 X 1/4 X 38-5/16" maple† (inlay)
E1	6	1/2 X 1-1/2 X 35" poplar (spacer)
E2	2	1/2 X 4 X 36-3/4" poplar (spacer)
F1	2	1-1/2 X 2 X 49-9/16" walnut (edge)
F2	2	1-1/2 X 2 X 38" walnut (edge)
F3	1	1-1/2 X 2 X 39-3/4" walnut (edge)
G	1	3/4 X 17-13/16 X 48-15/16" panel stock** (subtop)
H	2	3/8 X 3/4 X 22-1/4" walnut (edge band)
I	2	3/4 X 5-1/4 X 24-11/16" walnut panel stock (inner panel)
J	2	3/4 X 5-1/4 X 25-3/8" walnut panel stock (outer panel)
K	2	1/8 X 1/4 X 25-3/8" maple† (inlay)
L	2	3/4 X 3 X 25-3/8" walnut (bottom cap)
M1	4	1-1/2 X 2 X 5-1/2" poplar (block)
M2	2	2 X 2 X 5-1/2" poplar (block)
N	4	3/4 X 22-1/2 X 26-1/2" walnut panel stock (pedestal side)
O	4	3/4 X 5 X 26-1/2" walnut (pedestal endcap)
P	2	3/4 X 3-1/2 X 22-1/2" poplar (pedestal base)
Q	4	1/2 X 3-1/2 X 3-1/2" maple†† (foot)
R	50	No. 20 joining plate
S	2	3/8" T-nut
T	2	3/8 X 2-1/2" hexhead bolt and washer
U	8	1-1/4" No. 8 fh woodscrew
V	14	2" No. 8 fh woodscrew

The modern executive office desk isn't simply a place to hold a telephone. These days, it's the launching platform for grand ideas and big decisions. It's the basic real estate for projects, proposals, plans and programs. And, like any other business commodity, the more you have, the more work you get done.

Our custom desk is designed with a generous surface area and is ideal for those who need to spread out their work. While the broad V shape imparts a strong, dynamic visual effect, it also makes the space more accessible.

Of course, a high-end desk needs to look the part, as well. Our design features matched walnut-veneer panels with a decorative black inlay. The result is an elegant surface that's as functional as it is eye-catching.

To achieve the mirrored effect of the matched veneer panels, you'll need to order stock that has walnut veneers cut sequentially from the log. When you order the panels, specify that they be "sequence matched

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and numbered." The panel manufacturer will glue each veneer to its panel substrate in the same order that the veneers were cut. Each panel has a number that indicates its place in the sequence. When you plan the material for your desk, lay out your cut lines to make the best use of matching grain.

For our piece, we used walnut veneer on an MDF (medium-density fiberboard) core. These panels tend to be flatter and more stable than those with a veneer core (plywood). They also are about twice the weight of veneer-core panels, so you'll need a helper to move the parts around the shop.

The Pedestals

The two pedestal bases that support the desktop are constructed of veneered side panels with solid-walnut caps, all joined over a solid-poplar base. Study the plans to be sure you understand the construction details, then cut the pedestal sides (N), endcaps (O) and bases (P) to exact size. Mark the position of the joining plate slots in these pieces and use a plate joiner to make the cuts.

Lay out the notches on the two inner pedestal panels and cut these with a sabre saw. Then lay out and bore the hole in each panel for the bolt that connects each pedestal to the modesty panel assembly.

Apply glue to the slots, plates and edges of one of the poplar base pieces (P), install the plates and join two sides to the base. Use clamps to pull the joints tight and let the glue set. Repeat the process for the second pedestal.

Next glue the endcaps to the pedestal subassemblies using plate joints as shown. When the glue has dried, use a router and chamfer bit to cut the 1/2-in. bevel along the vertical edges of the pedestal faces.

The Modesty Panel

Cut the parts for the modesty panel to size. Pay close attention to the veneer on the front panels (J) so that, when assembled, one side of the modesty panel is a mirror image of the other. Begin assembly by joining the two mitered poplar blocks (M2) that form the core of the panel. Apply glue to the mating surfaces and clamp the blocks together. While the glue is drying, bore the 1/2-in.-dia. holes in the two end blocks (M1). Install a 3/8-in. T-nut on the inner surface of each block by tapping it into the hole with a hammer.

Next, glue and clamp one of the inner panels (I) to the center block assembly. Join the end and middle spacer blocks in the same way. Note that the end block must have the T-nut on its inner surface. Join the opposite inner panel to the center block and add the two spacers. When the subassembly is dry, glue the outer panels in place. Pay close attention to the quality of the miter joint at the front as this spot is quite prominent.

Use a router with straightedge guide to cut the rabbet along the bottom front edge of the modesty panel. Cut pieces of 1/8 X 1/4-in. black inlay strips (K) to size, and then apply glue to the rabbet and position the strips. Use pieces of masking tape placed about 2 in. apart to clamp the strips in place. Let the glue set for about 30 minutes, then remove the tape and scrape off any excess glue.

Apply glue to the bottom edges of the modesty panel and to the solid-walnut bottom caps (L). Then clamp the caps to the panel. After the glue sets, use a chamfer bit in the router to bevel the bottom edges of the cap.

Cut the subtop (G) to size and shape. Rip 3/8 X 3/4-in. edgeband strips of solid walnut (H) and glue them to the exposed edge of the subtop. Lay out and cut the joining-plate slots in the subtop edge and on the inside surface of the modesty panel. Then apply glue and join the parts. Bore and countersink holes in the subtop for fastening it to the pedestals and to the desktop.

The Desktop

In order to guarantee accuracy in cutting the desktop parts, make a template for one-half of the assembled desktop panel. You can then use this template to first outline and then cut the panel parts to finished dimension. Use a sheet of 1/4-in. tempered hardboard for the pattern, trimming it to exact size with a router and straight bit guided by a straightedge.

Lay out the desktop panels (A, B) by tracing around the template. Pay particular attention to achieving a good veneer match across the center joint of the top panel pieces. The bottom panels can be made out of a less expensive material or you can stick to walnut for consistency.

To accurately cut the panels, first use a sabre saw to rough cut them within 1/4 in. of finished dimensions. For final trimming, clamp the template to the panel and use the router with a flush-trimming bit to make the cuts. This leaves the smoothest possible surface with the least chance of chipped veneer.

Use a slotting cutter in the router to cut the spline grooves along the central panel joints. Then cut the poplar blocking strips (E1, E2) and maple splines (C) to size. The splines should be snug in their grooves, but not so tight that they need to be forced into place.

Join the two halves of the bottom panel first, so that you can get the feel for the process before moving on to the more critical top joint. Apply glue to the spline, spline groove and mating edges. Insert the spline and bring the two halves together. Use long bar clamps to gently pull the joint tight. Place pads under the clamp jaws to be sure that the clamps don't damage the panel edges. Follow the same procedure for the top panel. Handle these panels very carefully because the joint is rather fragile until the entire top is assembled.

Apply glue to the poplar spacing blocks and position them on the top surface of the bottom panel as shown in the drawing. Use clamps to hold the blocks in place until the glue sets. Then apply glue to the top of the blocks and position the top panel. Carefully check that the top and bottom panels are perfectly aligned before clamping them together.

Use long cauls across the width of the top to distribute the clamping pressure. The cauls work best if they have a slight bow and are used with the convex side toward the work. If the cauls happen to be straight, place a veneer shim under the center of each caul to ensure adequate pressure in the middle of the panel.

Use a router and straightedge guide to cut the rabbet around the desktop. Cut the black-dyed inlay strips (D1, D2, D3) to size, then apply glue to the rabbet, position the strips and use masking tape to clamp them until the glue sets. Carefully scrape off any excess glue from the top and edge of the panel.

Cut the solid walnut edge (F1, F2, F3) for the desktop from 2-in. stock. Installing one walnut edge at a time, apply glue to the mating surfaces and clamp each piece in place. At the ends, use special edging clamps that grip the panel surfaces to apply pressure on the edge.

Finishing

Sand the desktop, modesty panel and pedestals with 120-, 180- and 220-grit sandpaper, dusting off thoroughly between grits. Be sure to ease all edges and corners. Remove all sanding dust, then wipe the surfaces with a tack cloth.

In order to achieve a glass-smooth finish on the desktop, we used a paste filler on the top to fill the open grain of the walnut. These open pores are not a problem on the vertical surfaces, but on a horizontal surface, they would catch the light and be a distraction from the veneer pattern.

We used Behlen's Pore-O-Pac paste wood filler in Van Dyke Brown. Spread the filler across the grain of the top with a brush or rubber squeegee. Then, lightly reapply the filler with the grain. When the filler takes on a dull appearance, use a plastic scraper to remove the excess, and vigorously wipe the surface with burlap cloths to remove any remaining filler. Let the top dry overnight to allow any solvent to evaporate.

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To provide a tough, yet attractive, finish for the desk, we used three coats of Behlen's Rockhard Table Top Varnish. Thin the first coat approximately 20% with the appropriate reducer and use a quality bristle brush to apply the finish. Allow the finish to dry at least 12 hours, then sand lightly with 400-grit paper and dust off thoroughly. Allow the second coat to dry overnight, then lightly sand before flowing on the final coat.

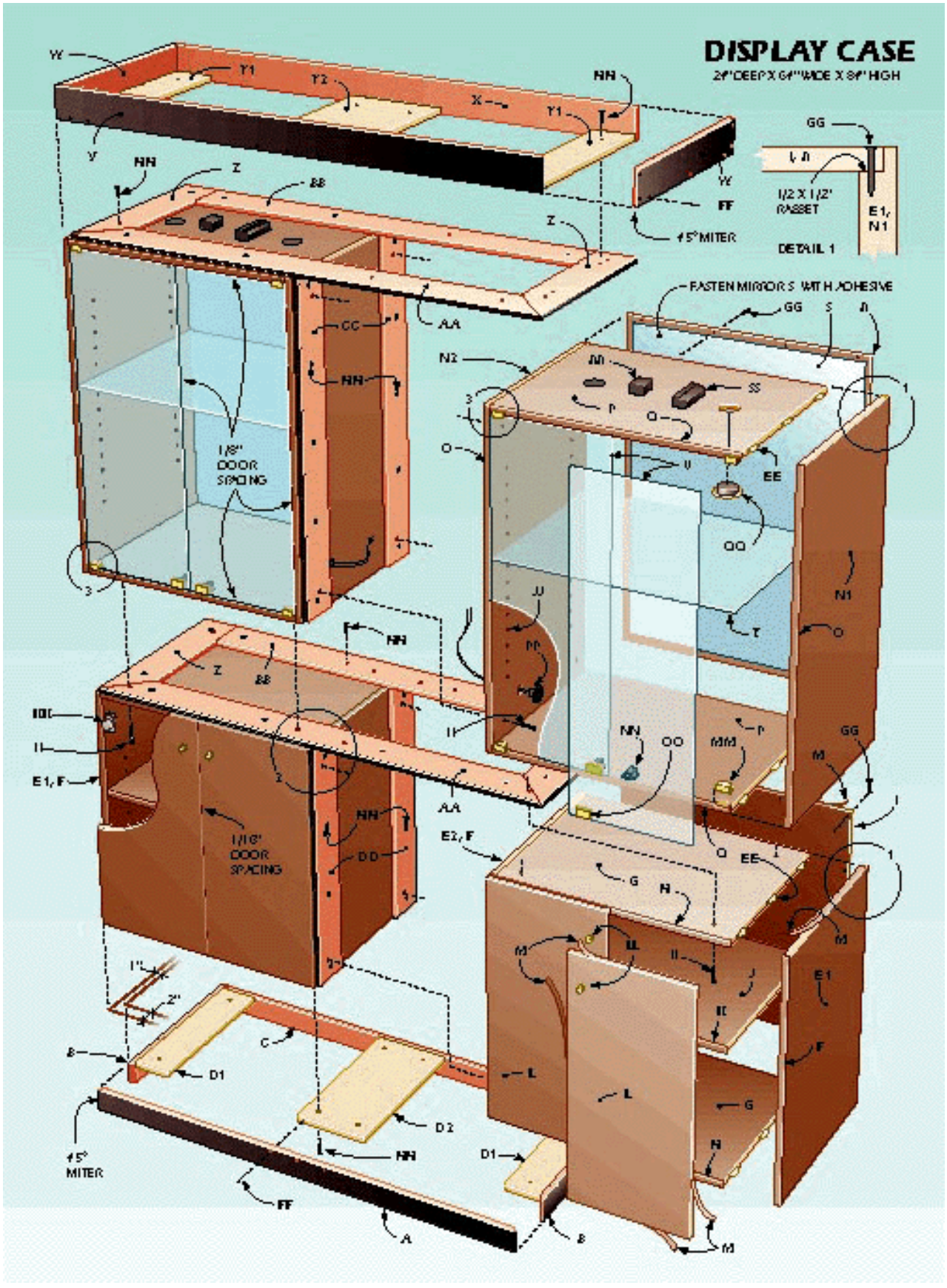
While you wait for the finish to dry between coats, you can cut, bore and countersink the maple feet for the pedestals. Sand the edges smooth, then use black enamel paint to finish the feet. Apply two or three coats as required for a good finish. When the paint and varnish are dry, screw the feet to the bottom of the pedestals.

To achieve a smooth, satin finish, you should rub out the varnish, especially on the desktop. Since this varnish is extremely hard, it should be rubbed and polished within 20 hours of applying the last coat. First, sand the top with 600-grit waterproof paper, using paraffin oil as a lubricant. When all dust particles and uneven spots are leveled, wipe the surface with a clean cloth and use No. 0000 steel wool to burnish the surface to an even satin glow. Polish the top with a soft cloth.

Join the modesty panel to the two pedestals. Use 3/8 X 2-1/2-in. hexhead bolts with washers to connect the parts. Then install screws through the subtop into the pedestal sides. Position the desktop over the base and fasten it with 2-in. No. 8 screws.

*****Walnut-veneer MDF or veneer-core panel
****** Walnut-, maple- or birch-veneer MDF or veneer-core panel
† Black-dyed inlay strips available from Dover Inlay Mfg. Co. Inc., Box 151, Williamsport, MD 21795
†† Painted black
Misc: Glue; 120-, 180-, 220- and 400-grit sandpaper; 600-grit waterproof paper; Behlen's Pore-O-Pac paste wood filler (Van Dyke Brown) No. B744-IF346; Behlen's Rockhard Table Top Varnish No. B603-28507; Behlen's Rockhard Varnish Reducer; black satin enamel paint.

DISPLAY CABINET



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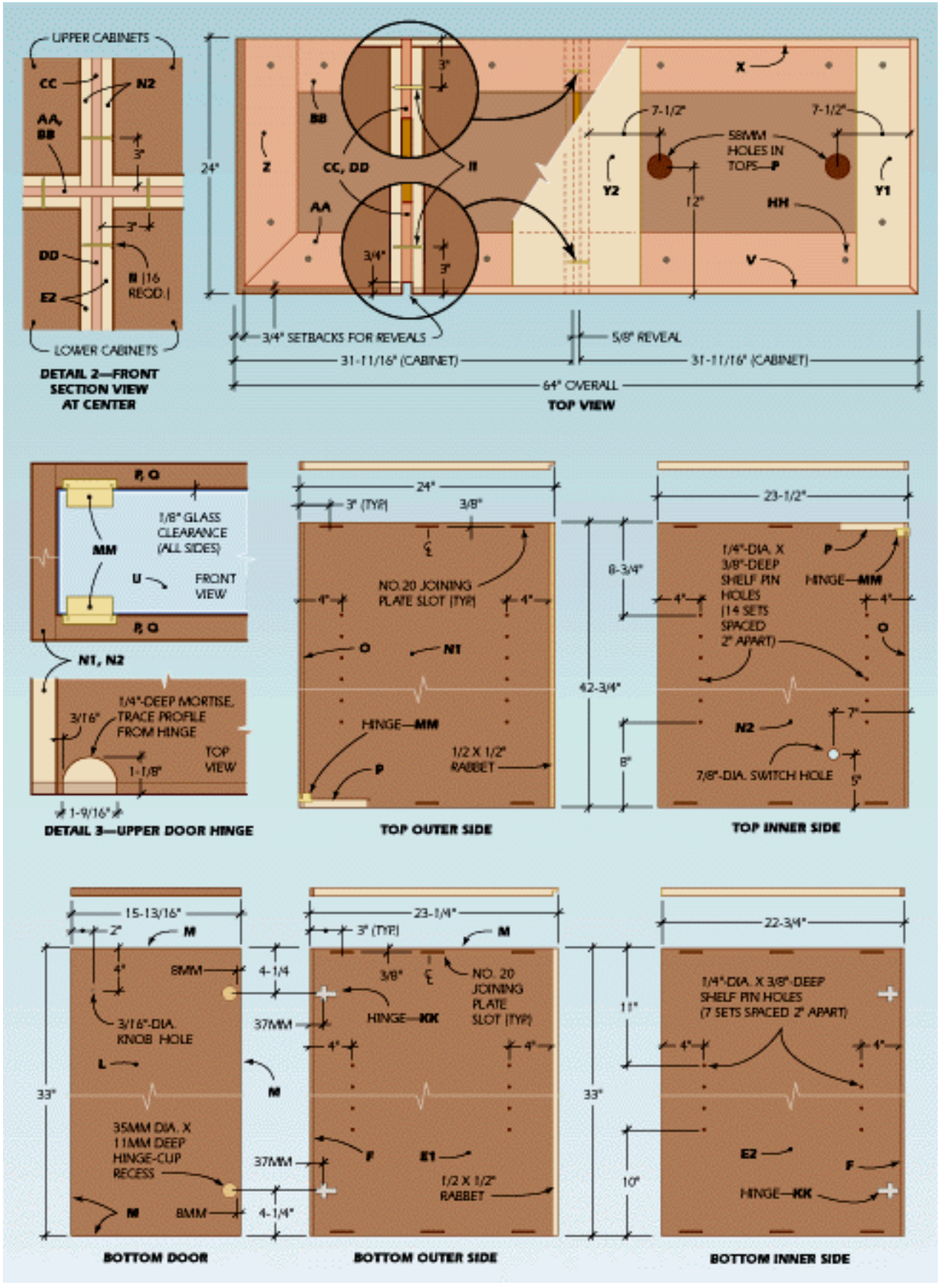

MATERIALS LIST–OFFICE DISPLAY CABINET

Key	No.	Size and description (use)
A	1	3/4 X 3 X 62" maple† (base front)

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B	**2**	**3/4 X 3 X 22" maple† (base side)**
C	**1**	**3/4 X 3 X 60-1/2" maple† (base back)**
D1	**2**	**3/4 X 5 X 20-1/2" panel stock**(side gusset)**
D2	**1**	**3/4 X 10 X 20-1/2" panel stock** (center gusset)**
E1	**2**	**3/4 X 22-7/8 X 33" walnut panel stock* ††(outer side)**
E2	**2**	**3/4 X 22-3/8 X 33" walnut panel stock* (inner side)**
F	**4**	**3/8 X 3/4 X 33" walnut (edge band)**
G	**4**	**3/4 X 22-3/8 X 30-3/16" walnut panel stock* (top/bottom)**
H	**4**	**3/8 X 3/4 X 30-3/16" walnut (edge band)**
I	**2**	**1/2 X 31-7/16 X 33" panel stock** †† (back)**
J	**4**	**3/4 X 22-5/16 X 30-1/16" walnut panel stock* (shelf)**
K	**4**	**3/8 X 3/4 X 30-1/16" walnut (edge band)**
L	**4**	**3/4 X 15-13/16 X 33" walnut panel stock* †† (door)**
M	**as reqd.**	**walnut-veneer tape**
N1	**2**	**3/4 X 23-5/8 X 42-3/4" walnut panel stock* (outer side)**
N2	**2**	**3/4 X 23-1/8 X 42-3/4" walnut panel stock* (inner side)**
O	**4**	**3/8 X 3/4 X 42-3/4" walnut (edge band)**
P	**4**	**3/4 X 23-1/8 X 30-3/16" walnut panel stock* (top/bottom)**
Q	**4**	**3/8 X 3/4 X 30-3/16" walnut (edge band)**
R	**2**	**1/2 X 31-7/16 X 42-3/4" panel stock** (back)**
S	**2**	**1/4 X 30-1/8 X 41-3/16" mirror**
T	**6**	**1/4 X 23-1/8 X 30-1/16" tempered glass (shelf)**
U	**4**	**1/4 X 14-7/8 X 41" tempered glass (door)**
V	**1**	**3/4 X 4 X 64" maple† (soffit front)**
W	**2**	**3/4 X 4 X 24" maple† (soffit side)**
X	**1**	**3/4 X 4 X 62-1/2 maple† (soffit back)**
Y1	**2**	**3/4 X 5 X 22-1/2" panel stock** (gusset)**
Y2	**1**	**3/4 X 12 X 22-1/2" panel stock** (gusset)**
Z	**4**	**5/8 X 5 X 23-1/4" maple† (side horizontal spacer)**
AA	**2**	**5/8 X 5 X 62-1/2" maple† (front horizontal spacer)**
BB	**2**	**5/8 X 5 X 52-1/2" maple† (back horizontal spacer)**
CC	**2**	**5/8 X 5 X 42-3/4" maple† (upper vertical spacer)**
DD	**2**	**5/8 X 5 X 33" maple† (lower vertical spacer)**
EE	**as reqd.**	**No. 20 joining plates**
FF	**as reqd.**	**4d finishing nails**
GG	**as reqd.**	**1" No. 5 fh woodscrews**
HH	**as reqd.**	**1-1/4" No. 8 fh woodscrews**
II	**as reqd.**	**2" No. 8 fh brass woodscrews**
JJ	**40**	**1/4" shelf pin–No. 62067†††**
KK	**4**	**pair bottom cabinet hinges–No. 34710†††**
LL	**4**	**polished brass door pull–Sugatsune No. GLA-16**
MM	**4**	**pair upper cabinet hinges–Hafele No. 361.49.809**
NN	**4**	**touch latch–Hafele No. 245.80.310**
OO	**4**	**touch latch strike–Hafele No. 245.63.826**
PP	**2**	**light switch–Hafele No. 823.78.327**
QQ	**4**	**halogen lamp–Hafele No. 823.29.850**
RR	**2**	**transformer–Hafele No. 823.24.436**

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SS	**2**	**mounting block–Hafele No. 823.24.418**

*Walnut-veneer MDF or veneer-core panel
**Walnut-, maple- or birch-veneer MDF or veneer-core panel (plywood)
† Painted black
†† Dimension includes walnut veneer-tape edge
††† Available from The Woodworkers' Store, 21801 Industrial Blvd., Rogers, MN 55374

Case Construction

Begin by cutting the walnut panels for the upper and lower cases. Pay special attention to matching the veneer on the outer sides so that the grain runs continuously from the lower- to upper-case side. Cut the panels slightly oversize, add the solid-walnut edge band (O, F) to the front edges of all panels and add the walnut veneer tape (M) to the top edges of the lower-case outer sides (E1). Then cut the panels to finished size.

Use the router with straightedge guide to cut the rabbet in the outer case sides (E1, N1) that hide the cabinet backs. Lay out the joining-plate slots in sides, tops and bottoms, and cut the slots with the plate joiner.

Make a boring template for the shelf-pin holes in the lower cabinets and a second template for the pin holes in the upper cabinets. A strip of 1/2-in. plywood or MDF is perfect for the template. Clamp the appropriate template to a cabinet side, and use it as a guide in boring the holes. A stop on the drill bit ensures uniform hole depth.

Mark the locations of the glass-hinge mortises on the upper-case top and bottom panels (P). Trace the hinges for the proper mortise shape. Use a router and straight bit to remove most of the waste from the mortises and finish with a sharp chisel and gouge. Test fit the hinge bases and make any necessary adjustments.

Lay out and bore the 7/8-in.-dia. holes for the light switches in the upper-case sides (N2). Use an adjustable circle cutter to bore the 58-mm-dia. holes for the halogen lights in the upper-case tops.

Sand the interior surfaces of the cabinet parts before assembly, finishing with 220-grit paper. Then, completely dust off the parts.

To assemble one of the cases, spread glue on each plate and in its slot before inserting the plate. Join the top and bottom to one of the case sides, then position the opposite side and apply clamps to pull the joints tight. Compare opposite diagonal measurements to check that the cabinet is square and adjust the clamps if necessary. Let the glue set for at least 30 minutes before removing the clamps. Repeat the process for the remaining cases.

Cut the 1/2-in. panels for the case backs (I, R). Note that the top edge of the lower-case backs must be covered with walnut-veneer tape. Apply the tape to the edge before cutting the panel to finished size. Bore pilot holes and temporarily fasten the backs to the cases with 1-in. No. 5 fh screws.

The Spacers, Base And Soffit

Prepare the maple spacers that fit between the cabinets and between the upper cases and the soffit. Temporarily screw the upper vertical spacers (CC) to an upper-case side and attach the lower vertical spacers (DD) to a lower case.

Cut the maple parts for the base and soffit, as well as the 3/4-in. gussets (Y1, Y2, D1, D2). Assemble the base and soffit with 4d finishing nails and glue. Set and fill the nail holes. When the filler dries, sand the assemblies.

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Lay the two bottom cases on their backs and clamp them together so that they are properly aligned. Bore pilot holes and temporarily screw the two cases together. Next, temporarily screw the base to the case bottoms. Stand the assembly on the floor. If necessary, shim the base so the assembly is level and stable.

Bore and countersink pilot holes in the spacers that separate the top and bottom cases. Then temporarily screw them to the top of the lower case assembly. Position the upper cases over the lower subassembly. Screw the upper cases together and fasten the upper half to the lower half by screwing through the tops of the lower cabinets. Then, temporarily install the top spacers (Z, AA, BB), place the soffit in position and temporarily secure it.

The Doors And Shelves

Select the panels for the lower cabinet doors so there will be a uniform, matching grain pattern across the lower cases. Cut the panels to size and apply walnut-veneer tape on all edges. Bore the 35mm recesses for the hinges in each door and mount the hinges on the doors. Attach the hinge mounting plates to the lower-case sides, mount the doors and adjust the hinges for proper spacing. Bore 3/16-in. holes for the door pulls and fasten the pulls to the doors.

For safety's sake, it's best to use tempered glass for the display case doors. Tempered glass must be specially ordered and cannot be altered once the tempering process is complete. Specify that the glass have polished edges and "dubbed" (slightly rounded or chamfered) corners.

Mount the glass-door hinge base plates to the cabinet, then attach the hinges to the tempered glass panels. First install the self-adhesive pressure plates to the corners of the glass doors. Then slide the hinges over the glass and gently tighten the screws. Carefully slide the door assembly into the base-plate tracks and thread in the door stops. Adjust the position of the glass doors for even spacing on all edges. Then install the strikes along the bottom edges of the glass doors. Mount the magnetic touch latches to the upper-case bottom panels.

Cut walnut panels for the lower-cabinet shelves and glue a walnut edge band to the front edge of each panel. Install shelf pins in the lower cases and test the fit of each shelf.

Use a dark pencil to outline the inside profile of each upper cabinet on the 1/2-in. backs. These marks will serve as registration guides for the mirrors. At this point, you can disassemble the cabinet for finishing. Any final adjustments and fitting can be done later. Remove all hardware, spacers, and the soffit and base. Sand all parts with 120-, 180- and 220-grit sandpaper, dusting off thoroughly between grits. When the sanding is complete, wipe all surfaces with a tack cloth.

Finishing

Paint the spacers, soffit and base with three coats of black satin enamel. Sand lightly between coats to achieve a smooth, even finish.

Apply three coats of varnish to the walnut case parts. We used Behlen's Rockhard Table Top Varnish. Thin the first coat 20% with Behlen's Rockhard Varnish Reducer and sand lightly with 400-grit paper after drying for 12 hours. Apply two more coats, full strength, again sanding lightly between coats. Let the last coat cure for no longer than 20 hours. Then wet-sand with 600-grit waterproof paper and paraffin oil to remove any dust particles. Wipe dry with clean cotton cloths, then buff with No. 0000 steel wool. Polish the finish with a clean, dry and soft cotton cloth.

Final Assembly

Use mirror mastic to mount the mirrors to the upper-cabinet backs. Lay the backs flat on a worktable and apply the mastic to the panels. Position the mirrors over the backs, aligning them within the registration marks. Let the mastic cure overnight before reinstalling the backs.

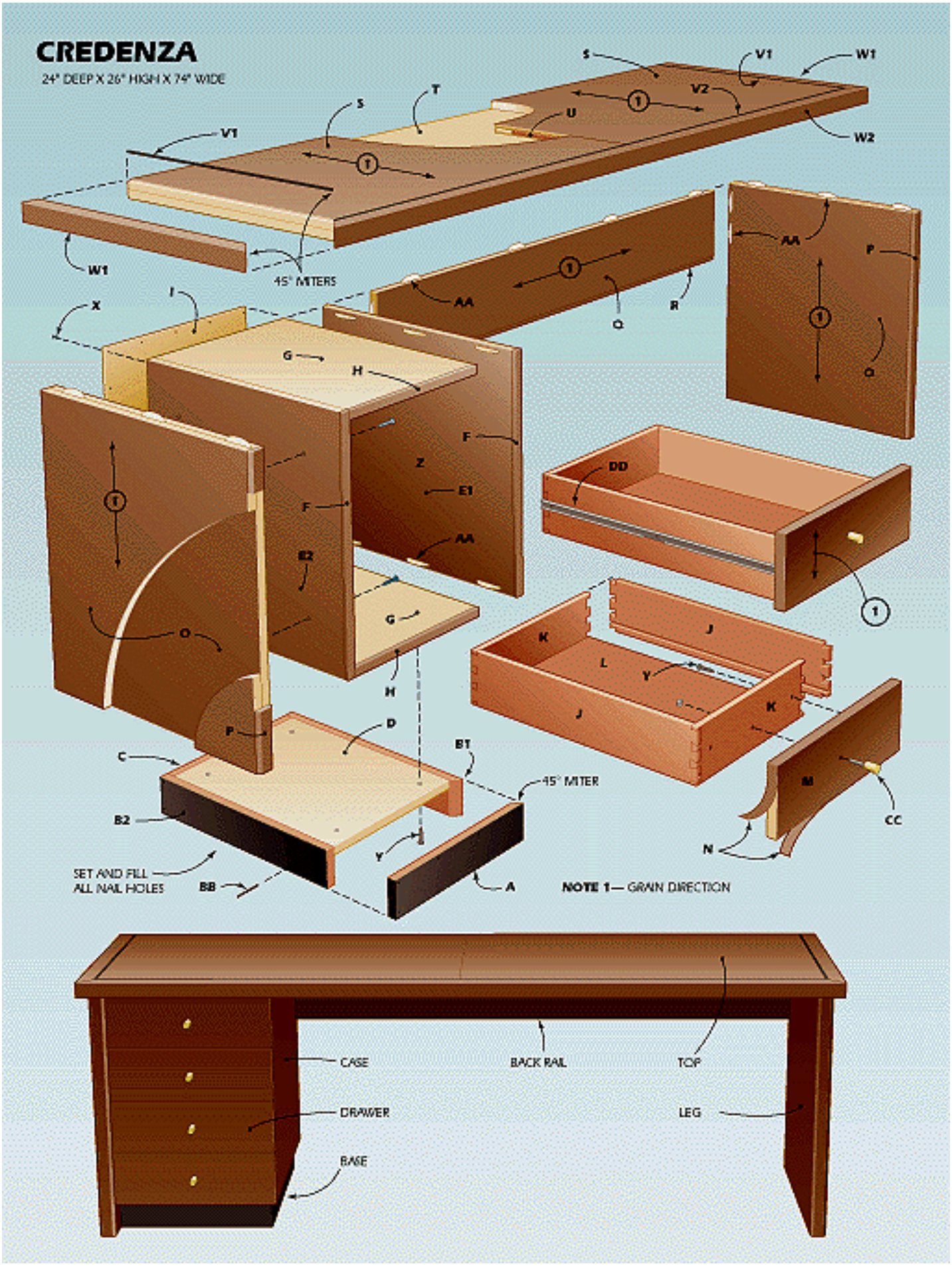
Reattach the spacers to the lower- and upper-cabinet sides. Join the lower cabinets together and reattach the base assembly.

Install the halogen lights in the tops of the upper cabinets and connect the wiring according to the diagrams that come with the lights. The halogen low-voltage system includes the lamps and a separate transformer, mounting block and light switch for each case. Fasten the transformers and mounting blocks to the top of each cabinet. Locate these parts so that they do not interfere with the placement of the spacers or soffit gussets. Install the switches on the case sides and route the wires up the sides and behind the vertical spacers. Use small electrical staples to hold the wires in place. Plug in the lights and check their operation before completing the cabinet assembly.

Replace the horizontal spacers on the lower-cabinet tops. Next, place the upper cabinets on the base, join them to each other and fasten them to the lower half. Reinstall the top spacers and attach the soffit. You can bore a 1-1/2-in. hole centered in the back of the soffit to allow the light cords to pass through, or you can simply let the cords drape over the top of the soffit.

Mount the hinges and mounting plates for the lower-case doors and rehang the doors. Rehang the glass doors and attach all door pulls. Finally, install the shelves.

CREDENZA



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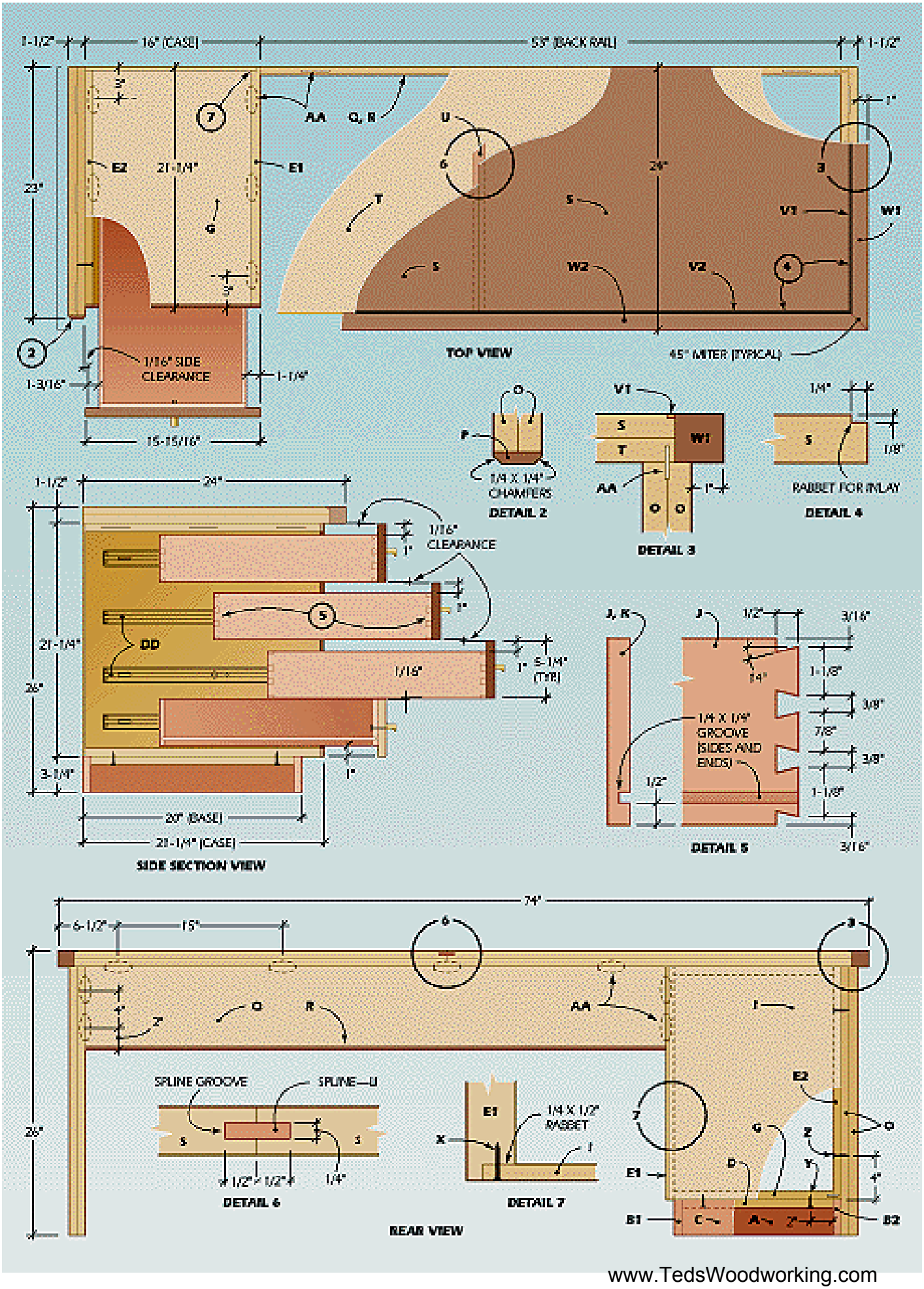

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MATERIALS LIST–CREDENZA

Key	No.	Size and description (use)
A	1	3/4 X 3-1/4 X 15-1/4" maple†† (base front)
B1	1	3/4 X 3-1/4 X 20" maple†† (base right side)
B2	1	3/4 X 3-1/4 X 19-1/4" maple†† (base left side)
C	1	3/4 X 3-1/4 X 13-3/4" maple†† (base back)
D	1	3/4 X 13-3/4 X 18-1/2" panel stock** (base top)
E1	1	3/4 X 21-1/4 X 20-7/8" walnut panel stock* (case right side)
E2	1	3/4 X 21-1/4 X 20-5/8" walnut panel stock* (case left side)
F	2	3/8 X 3/4 X 21-1/4" walnut (edge band)
G	2	3/4 X 14-1/2 X 21-3/8" panel stock** (case top/bottom)
H	2	3/8 X 3/4 X 14-1/2" walnut (edge band)
I	1	1/4 X 15-3/4 X 21-1/4" plywood (case back)
J	8	1/2 X 4-1/4 X 20" maple (drawer side)
K	8	1/2 X 4-1/4 X 13-1/2" maple (drawer end)
L	4	1/4 X 13 X 19-1/2" maple plywood (drawer bottom)
M	4	3/4 X 5-1/4 X 15-15/16" walnut panel stock*††† (drawer front)
N	as reqd.	walnut veneer tape
O	4	3/4 X 22-5/8 X 24-1/2" walnut panel stock* (leg panel)
P	2	3/8 X 1-1/2 X 24-1/2" walnut (edge band)
Q	1	3/4 X 7-5/8 X 53" walnut panel stock* (rail)
R	1	3/8 X 3/4 X 53" walnut (edge band)
S	2	3/4 X 22-1/2 X 35-1/2" walnut panel stock* (upper top panel)
T	1	3/4 X 22-1/2 X 71" panel stock** (lower top panel)
U	1	1/4 X 1 X 22-1/2" maple (spline)
V1	2	1/8 X 1/4 X 22-1/2" maple† (inlay)
V2	1	1/8 X 1/4 X 71" maple† (inlay)
W1	2	1-1/2 X 1-1/2 X 24" walnut (edge)
W2	1	1-1/2 X 1-1/2 X 74" walnut (edge)
X	as reqd.	3/4" No. 5 fh wood screw**
Y	as reqd.	1-1/4" No. 8 fh wood screw**
Z	as reqd.	1-1/2" No. 8 fh wood screw**
AA	as reqd.	No. 20 joining plate**
BB	as reqd.	4d finishing nail**
CC	4	drawer pull–Sugatsune No. GLA-16, polished brass
DD	4	20" full-extension drawer slide–No. 32839 ††††

*Walnut-veneer MDF or veneer-core panel
**Walnut-, maple- or birch-veneer MDF or veneer-core panel (plywood)
† Black-dyed inlay strips available from Dover Inlay Mfg. Co. Inc., Box 151, Williamsport, MD 21795
†† Painted black
††† Dimension includes walnut veneer-tape edge
†††† Available from The Woodworkers' Store, 21801 Industrial Blvd., Rogers, MN 55374

Begin by cutting the case parts (E1, E2, G) to size. Cut edge band strips (F) from solid walnut and glue them to the front edges of the panels. Use a router with an edge guide to cut the rabbet along the back edge of the exposed side of the base.

Lay out the joining-plate slots in the case parts and use a plate joiner to cut the slots. Apply glue to the slots and joining plates, install the plates and assemble the case. Use bar or pipe clamps to pull the joints tight and check that the assembly is square by comparing opposite diagonal measurements. Adjust the clamps if necessary and allow the glue to cure for at least 30 minutes before removing the clamps. Cut the 1/4-in. back panel (I) to size, bore pilot holes and install it on the case with 3/4-in. No. 5 fh wood screws.

Cut solid-maple stock to size for the base (A, B1, B2, C), and cut the 3/4-in. plywood base top panel (D) to size. Join the maple pieces to the panel and to each other at the corners with 4d finishing nails and glue. Make sure that the miter joint on the exposed corner is tight. Set and fill the nail holes. When the filler is completely dry, sand the base smooth with 120-, 180- and 220-grit sandpaper. Bore pilot holes in the base top and fasten the base to the case.

The Legs And Rail

Cut walnut panels to size for the legs (O). Apply glue to a pair of panels for each leg, then clamp them together until the glue sets. Cut a walnut edge band (F) for each leg assembly. Apply glue to one of the strips and the front edge of one of the legs, then clamp the strip in place. Repeat for the other leg. After the glue sets, scrape off any excess. Use a router and chamfer bit to cut the bevels along the front edges of the legs.

Cut the back rail to size and glue the walnut edge band (R) along its bottom edge. Lay out and cut the joining-plate slots in the ends and top edge of the rail and also in the leg panels and inner case side. Set these parts aside until the top is complete.

The Top

Cut the panels to size for the desktop. The top is formed by sandwiching together two pieces of 3/4-in. stock. The grain of the top panel (S) runs across the top, so the upper panels must be joined in the center. Pay close attention to matching the grain. Since the bottom panel (T) is not visible, cut it in one piece with the grain running along its length.

Use the router with a slotting cutter to cut the spline grooves in the mating edges of the top panels. Cut a maple spline to fit the groove, apply glue to the grooves, edges and spline and assemble the panel. Pull the joint tight with clamps and allow the glue to set. Spread glue on the desktop panels and stack them together with all edges perfectly flush. Use enough clamps and cauls to distribute even pressure across the top. Let the glue set for at least 1 hour.

Use a router and edge guide to cut the rabbet around the front and ends of the top. Trim the black inlay strips (V1, V2) to size. Since the strips come in 3-ft. lengths, there will be joints along the front edge of the top. To keep these seams hidden, use 45 degree scarf joints instead of butt joints. Apply glue to the rabbet and install the inlay strips. Use masking tape spaced 2 in. apart to hold the inlay while the glue sets. After 30 minutes, remove the tape and scrape off excess glue.

Cut the solid-walnut edge (W1, W2) to size from 2-in. stock. Spread glue on both the panel edge and one of the solid edge pieces, and clamp the piece in place. Be sure to keep the top surfaces of the veneered panel and walnut edging perfectly flush. Repeat the process for each edge.

Assembly

Lay out the joining-plate slots on the bottom side of the desktop and use the plate joiner to cut the slots. Sand the desk parts with 120-, 180- and 220-grit sandpaper.

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Spread glue in the joining-plate slots at the ends of the back rail and in the mating slots at the case and right leg. Spread glue on the joining plates, install the plates and join the rail to the case and leg. Use bar clamps to pull the joints tight. While the glue sets, bore and countersink pilot holes through the left case side to attach the left leg and fasten the leg with screws.

Apply glue to the slots in the desktop and on the top edges of the base parts. Spread glue on the joining plates, install them and place the top on the base. Be sure to use pads under the clamp jaws when pulling the joint tight.

Drawer Construction

Cut maple to size for the drawer parts. We used a Leigh dovetail jig and a router to cut the drawer joints. If you use another type of jig, or decide to cut the joints by hand, the layout may vary. Follow the directions that come with your jig for cutting the joints.

Use a dado blade in the table saw to cut the drawer-bottom grooves in the other drawer parts. Cut the bottoms from 1/4-in. maple or birch plywood. Sand the inside surfaces of each drawer part with 120-, 180- and 220-grit sandpaper, but be careful to not sand the joint surfaces or the dovetails will not fit properly.

Use a small brush to spread glue on the dovetail-joint surfaces, then assemble one of the sides to a front and back. Slide the drawer bottom into position, then join the remaining side. If the joints fit properly, you will not need to clamp the drawer together. Just compare opposite diagonal measurements to be sure that the drawer is square and set it aside until the glue sets. When the glue is fully cured, sand the exterior of all drawers.

Cut the drawer faces from a single walnut panel so the grain will run continuously when the drawers are in place. Number the faces on the back side so that you can keep them in the proper order and apply walnut-veneer tape on all edges. The tape comes with hot-melt glue applied to its back side so you can use a household iron to adhere it.

Sand the drawer faces, then attach them to the drawer boxes with 1-in. No. 8 screws. Note that the position of the bottom face, relative to the drawer box, is different from that of the other faces. Install the drawer slides according to the instructions that come with them. Bore pilot holes for the drawer pulls and install them with the appropriate screws.

Remove the drawers and sand the credenza to eliminate any scuffs and scratches and thoroughly remove all dust. Wipe all surfaces with a tack cloth.

Finishing

First, finish the case base by applying two or three coats of satin black enamel. Lightly sand between coats to ensure a smooth surface.

Apply Behlen's Pore-O-Pac (Van Dyke Brown) paste wood filler to the top using a brush or rubber squeegee. Spread the filler across the grain, then re-apply it with the grain. When the paste takes on a dull appearance, remove the excess with a plastic scraper, then buff the surface vigorously with burlap cloths. Let the top dry overnight before proceeding.

Use three coats of Behlen's Rockhard Table Top Varnish for the final finish. Thin the first coat 20% with Rockhard Varnish Reducer. After 12 hours drying time, lightly sand the surface with 400-grit paper and wipe with a tack cloth. Apply two more coats, allowing overnight drying and light sanding between coats.

Let the final coat cure for no longer than 20 hours, then wet-sand the surface with 600-grit paper and paraffin oil. When all dust and uneven spots are gone, wipe the surface with a soft cloth to remove the oil and slurry. Use No. 0000 steel wool to burnish the surface, then polish the desk with a soft, lint-free cloth.

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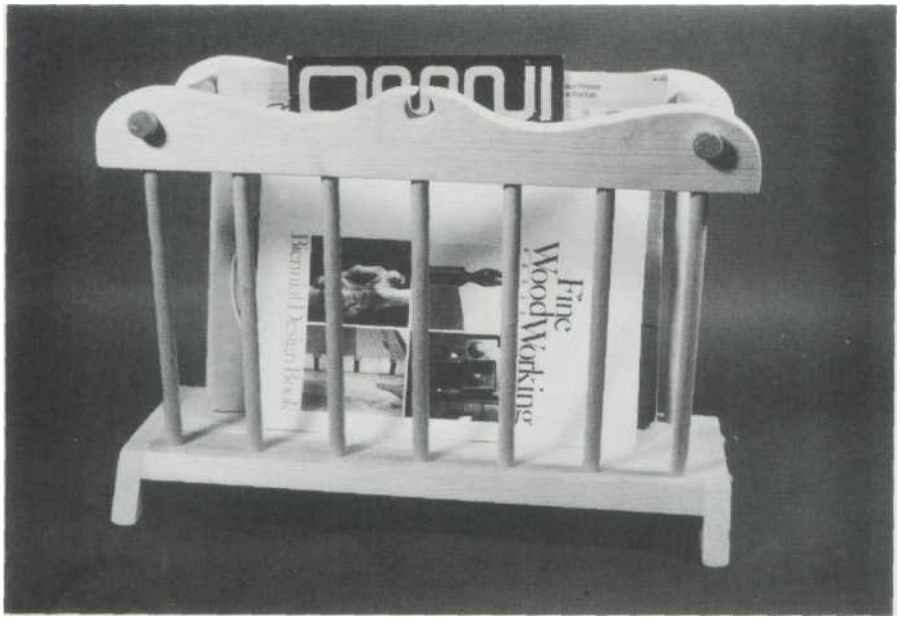
MAGAZINE RACK



What better place to store your periodicals than in this inexpensive magazine rack? Using standard size left over from other projects, you can build it in no time at all.

1. Sand all stock with 1OO-grit paper to remove mill marks.

2. Mark the location of all holes to be drilled. The fourteen 1/2"-diameter column holes in the base (A) and the four 3/4"-diameter brace holes in the rails (C) must be drilled at 10° angles.

3. Change the drill press table back to 90° to drill the fourteen 1/2"-diameter column holes and the 3/4"-diameter decorative holes in the top rails.

4. Using the patterns provided, cut the contours of the top rails and the feet (B).

5. With a handsaw or table saw, cut a 60° bevel on the edges of the base and the ends of the feet. Make sure the pieces are exactly the same width and the same angle where they join.

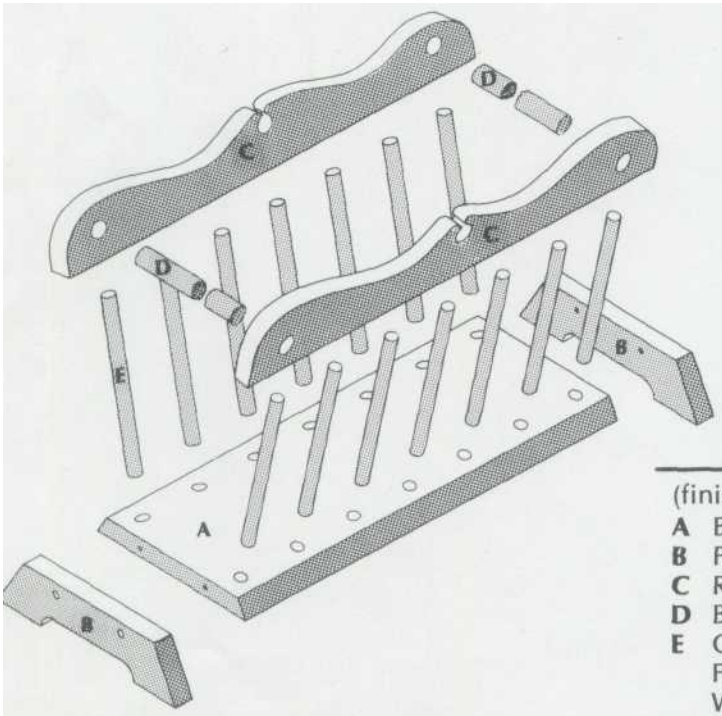
6. Cut the braces (D) and columns (E) to length, making sure to knock off any burrs on the ends.

7. To assemble, first attach the feet to the base using glue and #8 x 1-1/2" flathead wood screws. Countersink the screws.

8. To complete the rack assembly, use glue to fasten the ends of the columns and braces. Be sure to wipe off any excess glue immediately with a damp rag.

9. Use a sanding block to round over all sharp edges, including the protruding ends of the braces, and to smooth the joints between the base and legs.

10. Stain the rack with an Early American stain. Natural oil is recommended for the finish.



LIST OF MATERIALS

(finished dimensions in inches)

A	Base	3/4 × 7 × 16-1/2
B	Feet (2)	3/4 × 2 × 8-3/8
C	Rails (2)	3/4 × 2-1/2 × 18
D	Braces (2)	3/4-dia. × 9-3/4 dowels
E	Columns (14)	1/2-dia. × 10-1/2 dowels
	Flathead wood screws	#8 × 1-1/2
	Wood glue	

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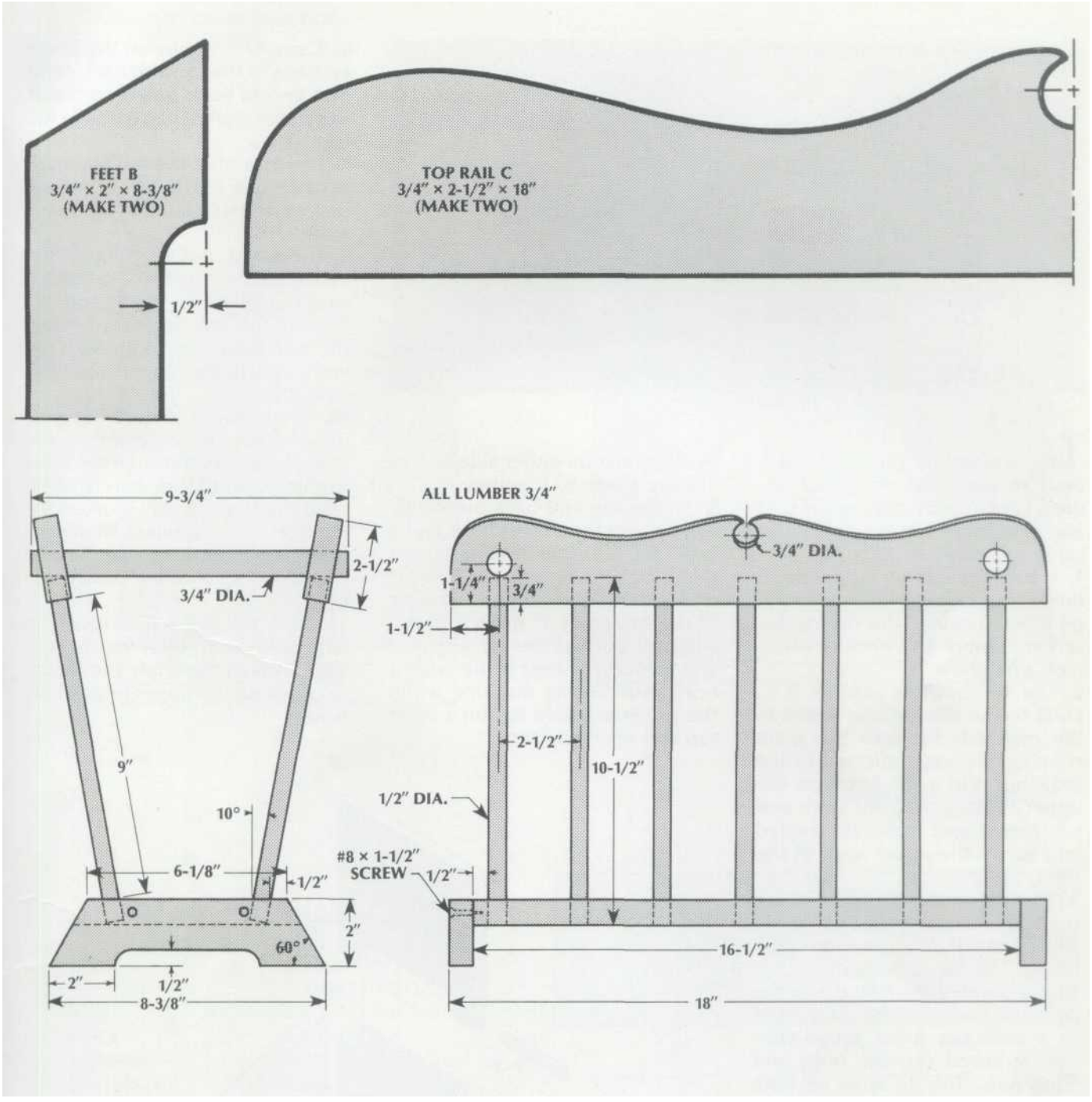

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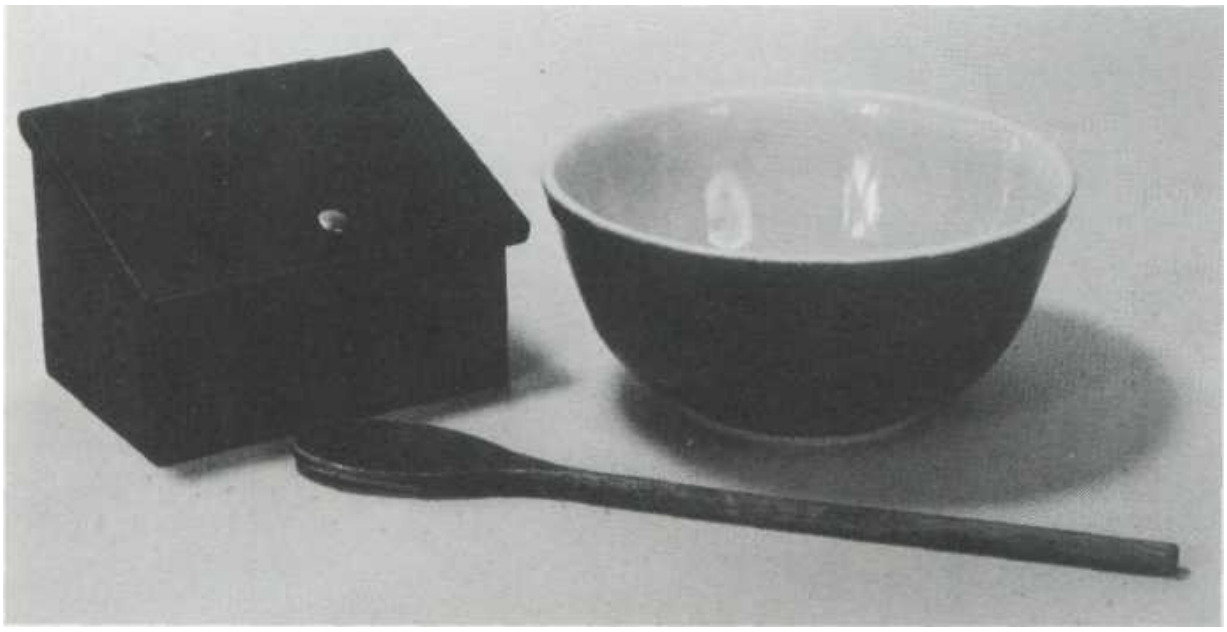
RECIIPE BOX

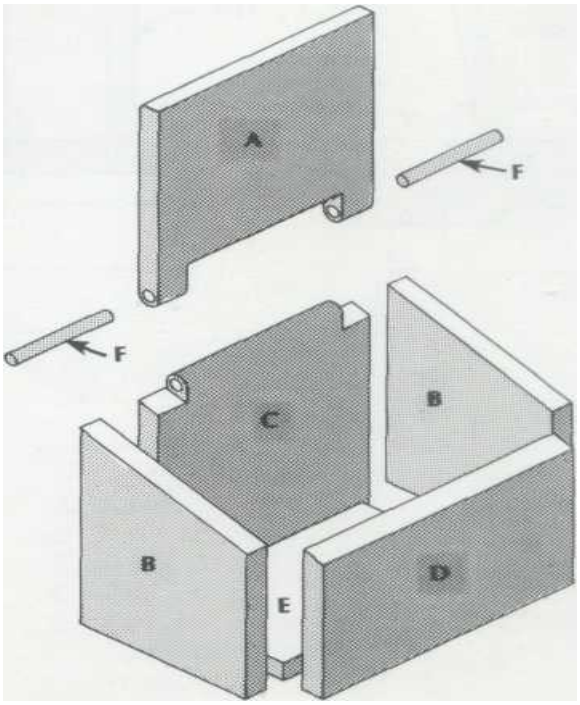


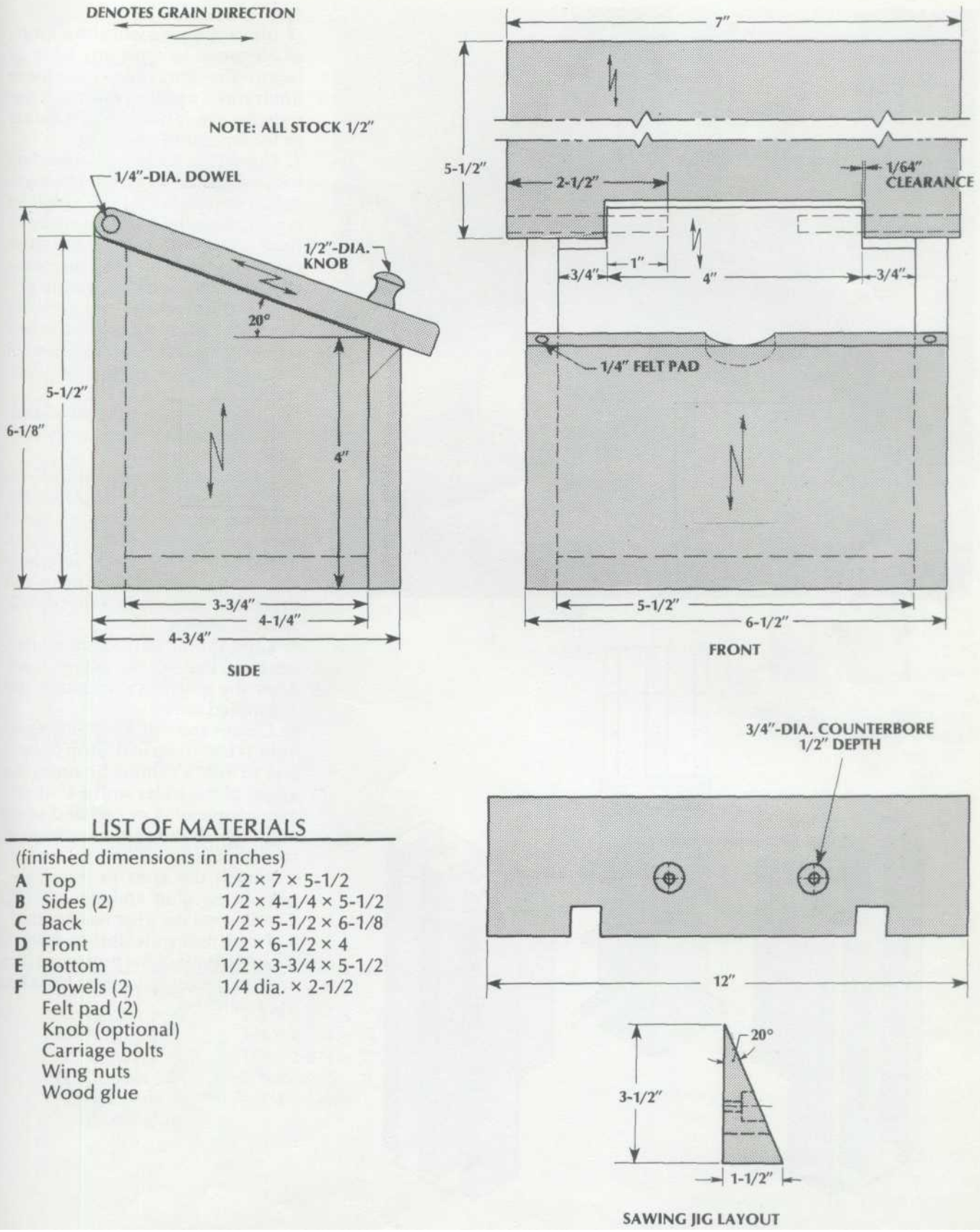
This recipe box can hold more than recipe cards—buttons, address cards, candy, crayons, almost any little thing around the house can find a home in it.

1. If you are unable to purchase the 1/2" stock needed for the recipe box, custom plane the necessary amount of 3/4" stock or resaw t on a bandsaw.
2. Cut the basic box parts (A, B, C, D, E) to the dimensions found in the materials list with the grain running the way indicated in the drawings. Rip a 70° bevel on the upper edges of the front, back, and top pieces and make 70° angled cuts across the upper ends of the sides.
3. Make a simple jig to hold the top and back pieces at a 70° angle while you make the cutouts for the hinge. The jig consists of a 2 x 4 with a beveled front face (see the jig layoutend view) that is fastened to a table saw miter gauge with counterbored carriage bolts and wing nuts. The jig must be long enough to be used on either side of the saw blade. (A 12" length should suffice for most saws.)
4. Cut the notches on the top and back pieces with your saw blade (or dado blades, if you have them) set to a height of 9/16". Hold each piece firmly against the jig and keep its beveled edge flush with the table top while cutting. Make the notch at the center of the top piece wide enough to create 1/64" of clearance on either side where the two pieces fit together.

Fit the top and back pieces together with their faces flush and a 1/16"-thick spacer holding them slightly apart. Center and drill 1/4"-diameter holes through each wing of the top piece 1" deep into the adjacent part of the back piece. This process is best done with a horizontal boring machine while the prices are held flat on a table top and against a fence.

6. Cut a 1/2" radius on the hinge sections of the top and back. Sand one end of each dowel so that it will rotate easily when fit inside the back.
6. Dry assemble the top and back to make sure the dowels fit and the hinge operates properly. Sand parts as needed.
7. If desired, cut a scallop in the inside edge of the front to make it easier to get to the front cards.
8. Glue the box together without the top. Keep excess glue off the visible parts and clamp until the glue dries.
10. Set the top in place lining up its dowel holes with those of the back.Push the dowels through the holes in the top until they barely penetrate the back. Apply glue on the last 3/4" of each dowel, then push them the rest of the way in until they are flush with the sides of the top.
11. Give the box a final touch up with sandpaper, then finish as de sired. Attach the knob and mount felt pads on the upper edge of the front.





LIST OF MATERIALS

(finished dimensions in inches)

A	Top	1/2 × 7 × 5-1/2
B	Sides (2)	1/2 × 4-1/4 × 5-1/2
C	Back	1/2 × 5-1/2 × 6-1/8
D	Front	1/2 × 6-1/2 × 4
E	Bottom	1/2 × 3-3/4 × 5-1/2
F	Dowels (2)	1/4 dia. × 2-1/2
	Felt pad (2)	
	Knob (optional)	
	Carriage bolts	
	Wing nuts	
	Wood glue	

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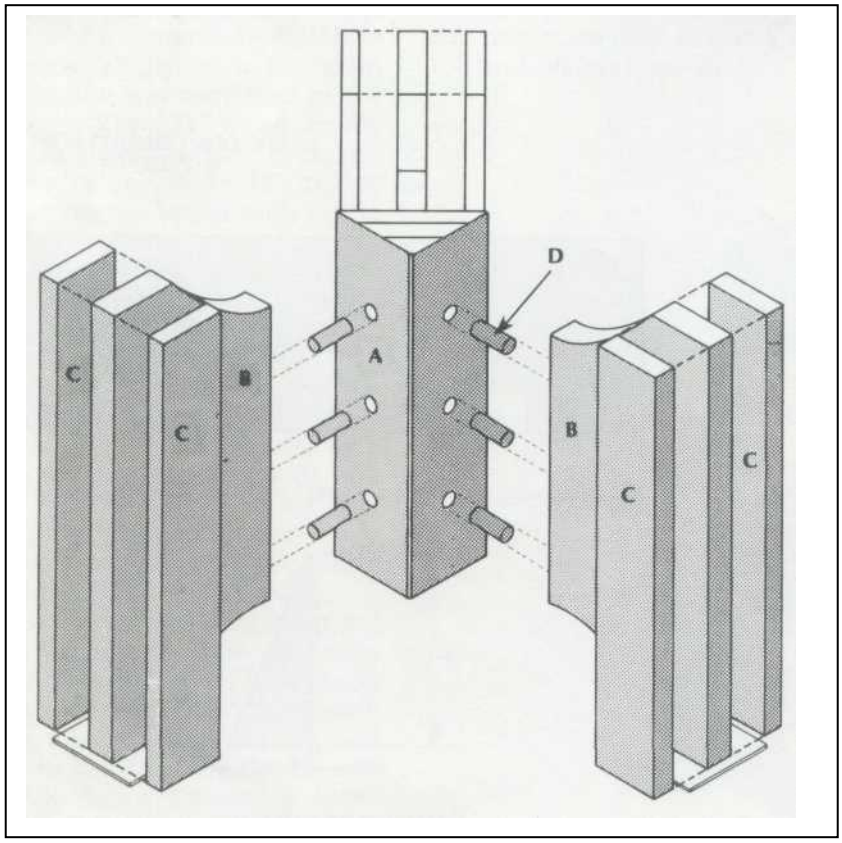
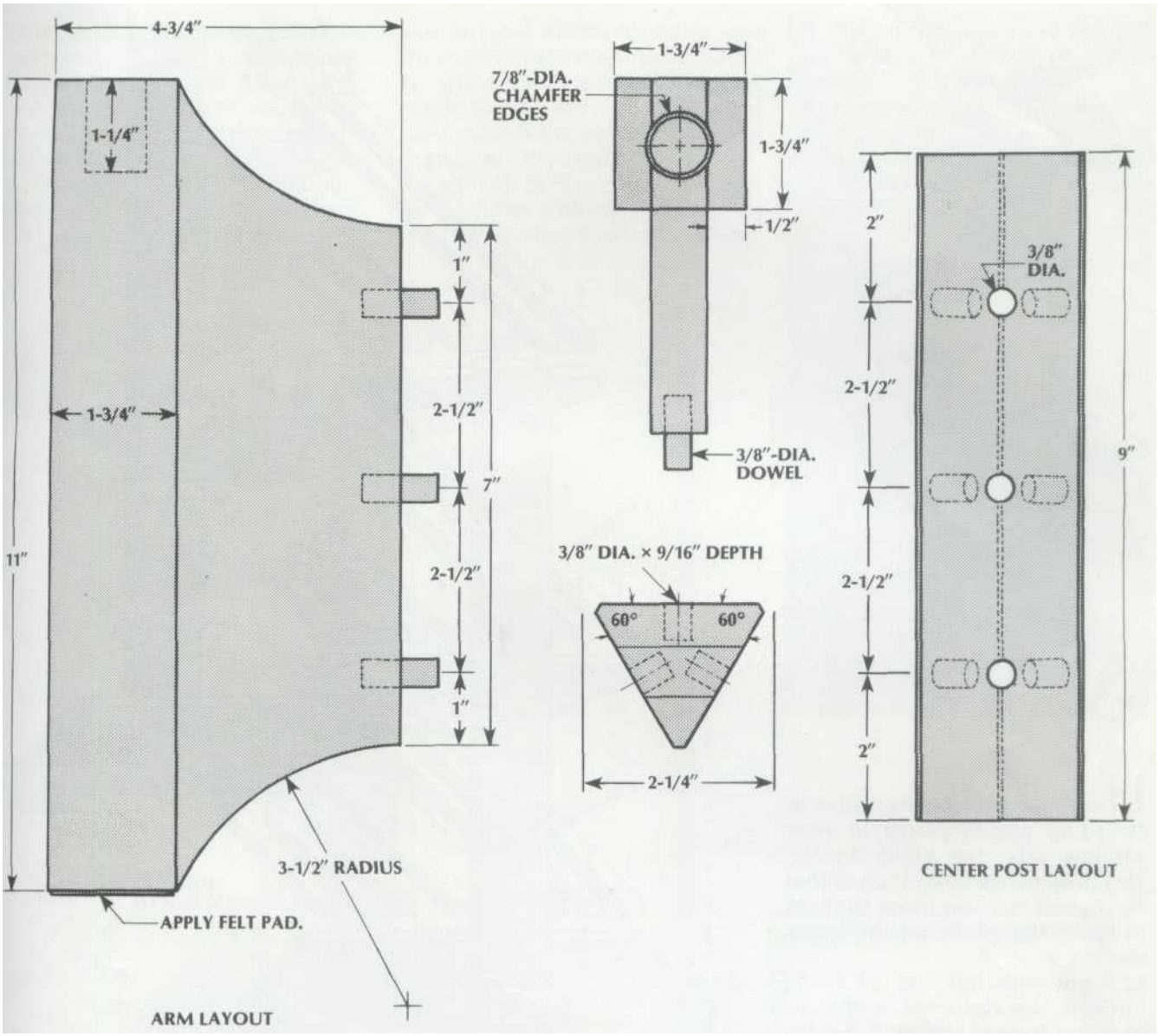
CANDELABRA



This candelabra will add a touch of elegance to most any table or room. The attractive centerpiece holds three candles, making it just right for a quiet candlelight dinner or for emergency lighting.

1. Cut all pieces to size according to the dimensions given. The trian gular center post (A) can either be cut from a solid piece of wood or from glued-up stock. In the latter case, it is a good idea to make some of the 60° beveled cuts prior to glu ing up the material and finishing the job with a hand plane and belt sander. Flatten the sharp corners of the post with a sander or block plane.
2. Cut out the arms (B) on a band-saw, then sand the edges smooth with a drum sander.
3. Drill matching sets of 3/8"-di-ameter holes 9/16" deep into the center post and the inside edge of each arm for doweling the pieces together. Center the middle hole along the length of each piece and space the remaining holes 2-1/2" apart as shown.
4. Glue the sides (C) to the arms, keeping their outer edges flush. After the glue has dried, sand the assembled arms.
5. Center and drill a 7/8"-diameter hole 1-1/4" deep in the top of each arm to hold a candle. Chamfer the edges of the holes with a 1"-diam-eter countersink or by hand sand ing; this will allow the candles to fit in more easily.
6. Attach the arms to the center post using glue and dowels (D). Clamp until the glue has dried.

Finish the candelabra as desired. Glue felt pads to the bottoms of the arms to prevent furniture from be ing scratched.



LIST OF MATERIALS

(finished dimensions in inches)

A	Center post	2-1/4 × 2-1/4 × 2-1/4 × 9
B	Arms (3)	3/4 × 4-3/4 × 11
C	Sides (6)	1/2 × 1-3/4 × 11
D	Dowels (9)	3/8 dia. × 1
	Felt pads (3)	1-3/4 × 1-3/4
	Wood glue	

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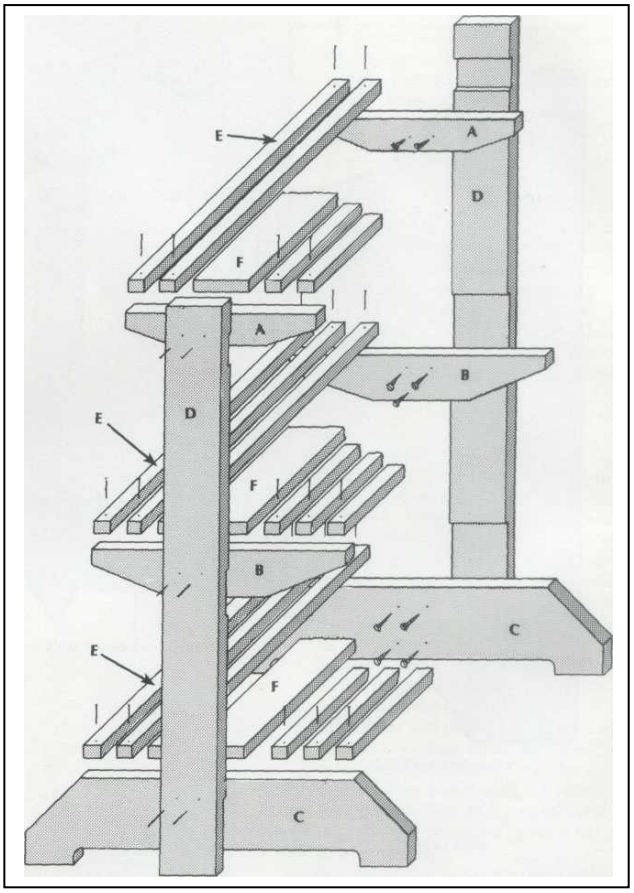
PLANT DISPLAY

Here's the perfect alternative to crowding potted plants in your window sills: the plant display. This project has three shelves that are slatted to allow more sunlight to reach the plants on the lower shelves.

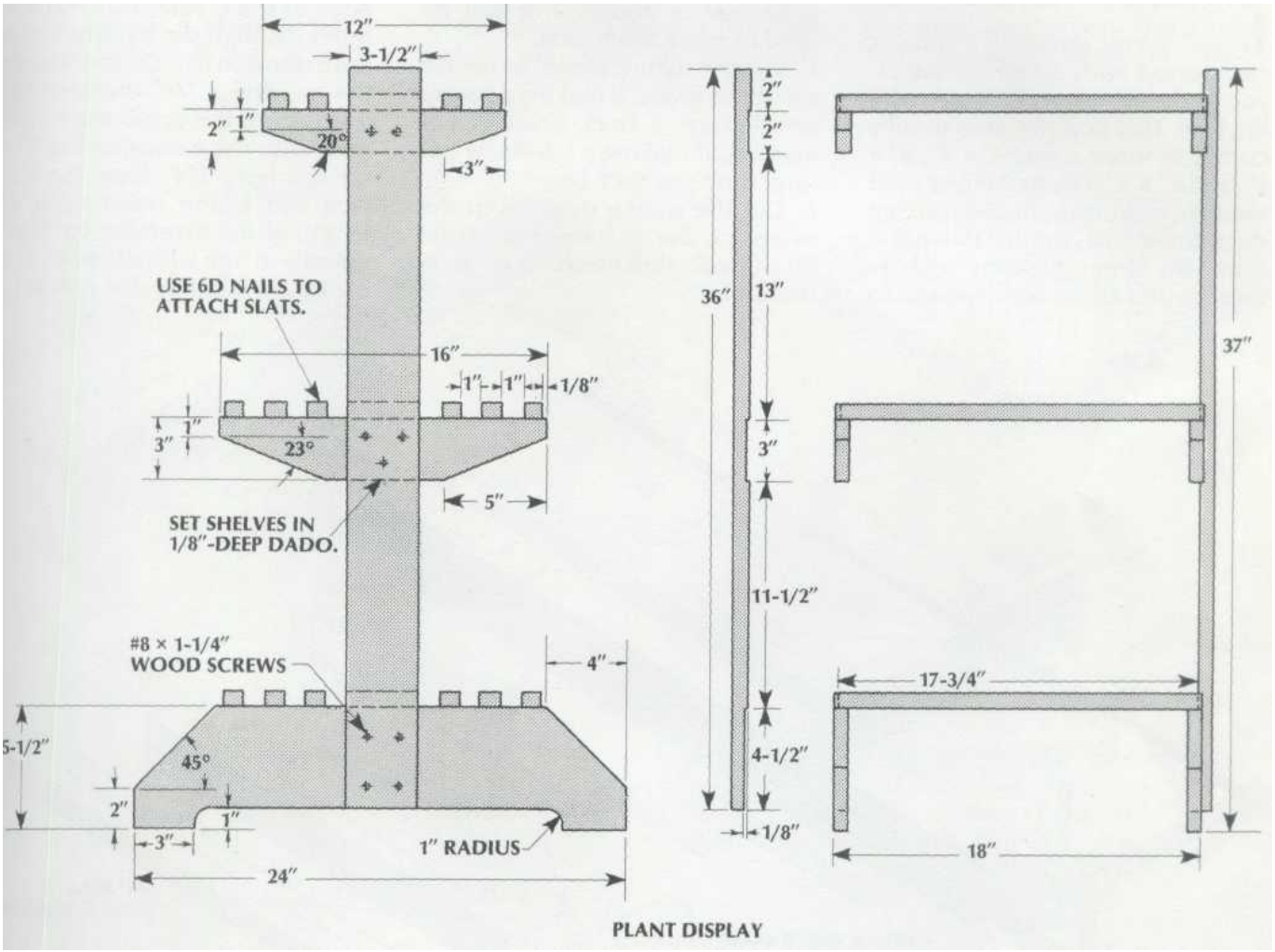
1. Begin with ten feet of 1 x 12 lumber. Use redwood, cedar, or pressure-treated lumber if the dis play is intended for outdoor use.
2. Cut all pieces to size on a table saw.
3. Lay out and mark the various angles on the ends of the top shelf sides (A), middle shelf sides (B), and the base pieces (C). Cut these angles using a bandsaw and 1/4" blade.
4. Using a router or a saw fitted with dado blades, cut 1/8"-deep dadoes and rabbets in the posts (D) for the shelf sides and base pieces.
5. Dill screw holes in the shelf sides and the base pieces, and cor responding pilot holes in the posts Drill pilot holes in the shelf slats (E) and center pieces (F) to accommodate 6d finishing nails. (Use one of the nails as a drill bit to assure that the diameter of the pilot holes is drilled accurately.) 6. Sand all of the pieces smooth. The sawed edges should be given an extra sanding, or be touched up
with a hand plane, to make sure they are sufficiently smooth. 7. Attach the slats and shelf center pieces to the sides with 6d finishing nails. Attach the centers first, and then install the slats at 1" intervals. Set all nails below the surface and fill the holes with wood putty that matches the finish you plan to use.
8. Attach the shelves to the posts using #8 x 1-1/4" flathead wood screws.
9. Finish the plant display with poly-urethane or some other water-resistant finish if it is not made of redwood, cedar, or pressure-treated lumber.



LIST OF MATERIALS

(finished dimensions in inches)

A	Top shelf sides (2)	3/4 × 2 × 12
B	Middle shelf sides (2)	3/4 × 3 × 16
C	Base pieces (2)	3/4 × 5-1/2 × 24
D	Posts (2)	3/4 × 3-1/2 × 36
E	Shelf slats (16)	3/4 × 1 × 18
F	Shelf center pieces(3)	3/4 × 3-1/2 × 17-3/4
	Flathead wood screws	#8 × 1-1/4
	6d finishing nails	



PLANT DISPLAY

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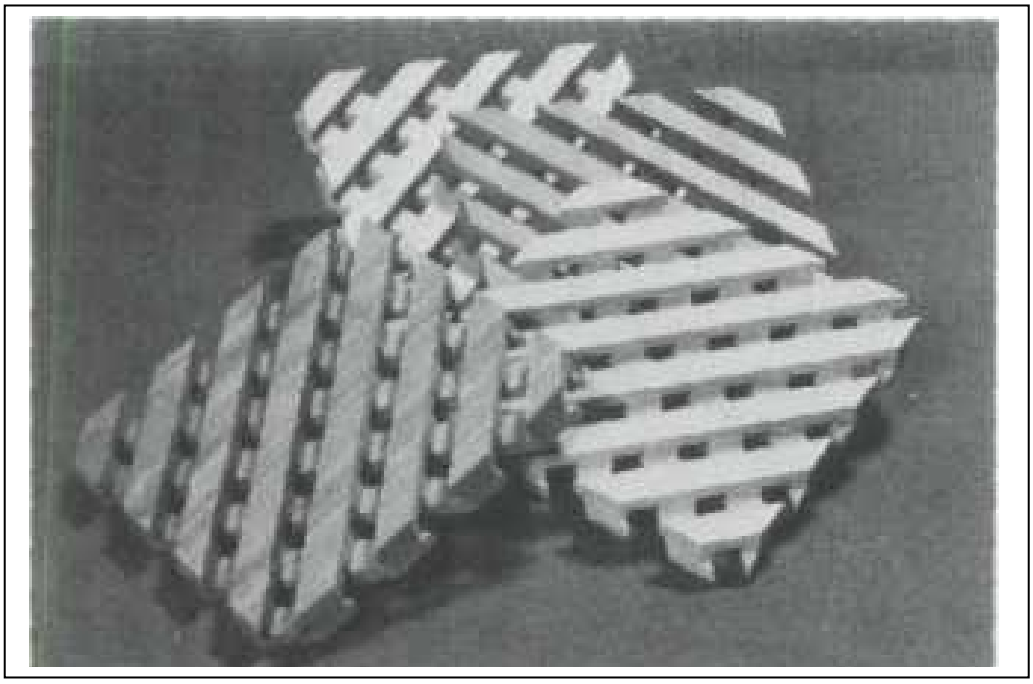
TRIVETS

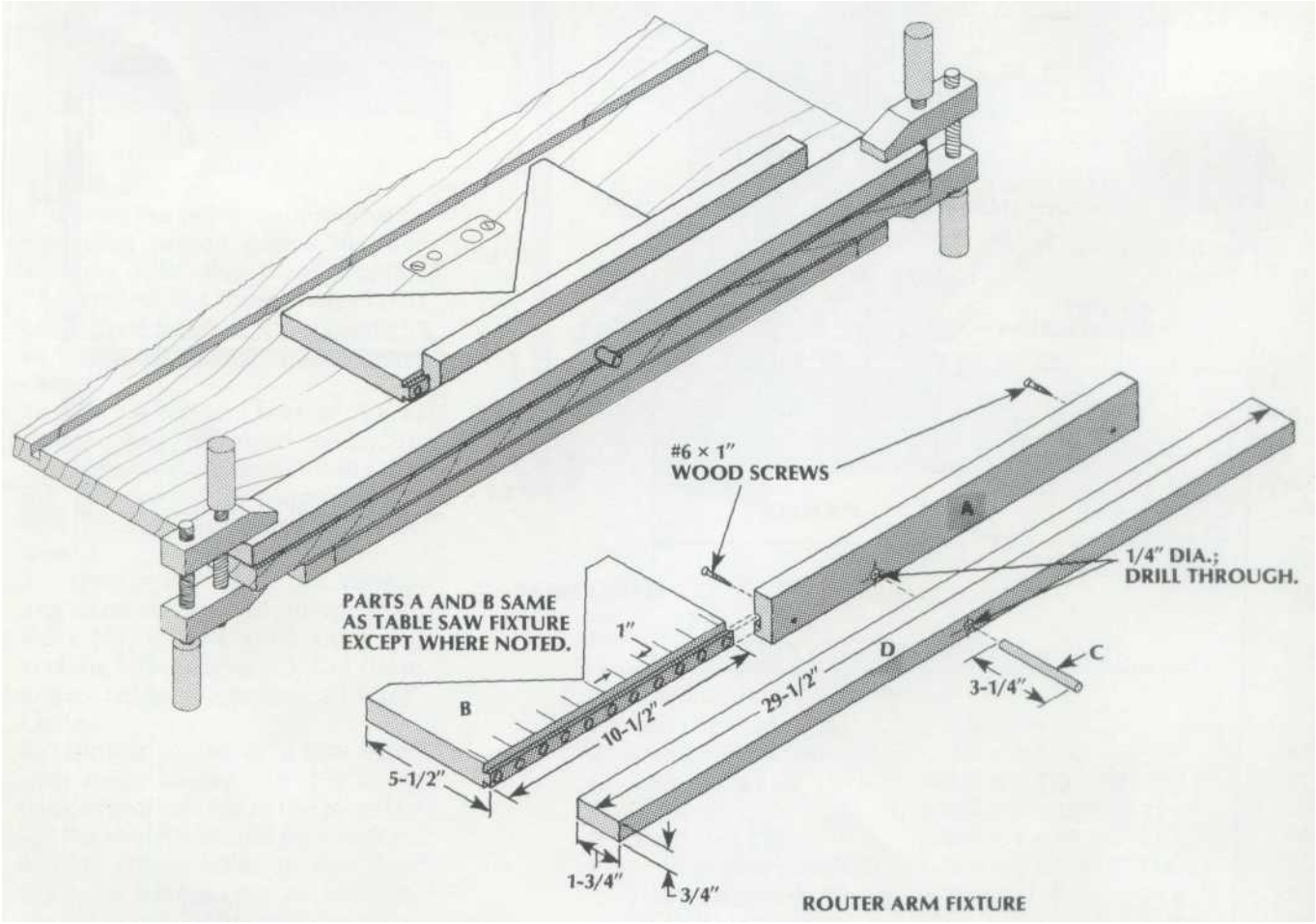


If you've ever scorched a table or countertop with a hot container, you know the value of trivets in the kitchen. This popular item usually comes in three sizes: 4" x 4", 6" x 6", and 8" x 8". The technique used involves making multi-intersecting decorative cuts, similar to what is done on larger projects such as door panels and room dividers. To do this, you will need a simple fixture and a table saw or router arm, such as the homeowner model made by Shopsmith.

MAKING THE FIXTURE

The purpose of the fixture is to make straight, accurate cuts while holding the blanks securely in place. Construction of the fixture varies, depending on whether a table saw or router arm will be used to make the trivets.

1. Cut the fixture pieces to the dimensions given. If making a router arm fixture, a back brace (D) is needed; if making a table saw fixture, omit the back brace.
2. Cut the sliding dovetail in the extension bar (A) and the cradle (B). Check the fit—it must slide smoothly.
3. Place the extension bar and cradle on the table saw or router arm table, lining up the center of the cradle V-notch with the cutter. Mark a centerline on the cradle and extension bar, then mark one inch increments on both sides of the centerline.
4. On the router arm fixture, center and drill 1/4"-diameter indexing holes 3/8" deep into the back edge of the cradle; drill matching holes through the back brace and the extension bar. On the table saw fixture, drill a 1/4"-diameter hole down from the upper edge 2-1/4" deep into the extension bar. Center the hole 1/4" from the front face and at the point along the length of the extension bar that is directly in line with the saw's dado blades. Make indexing notches in



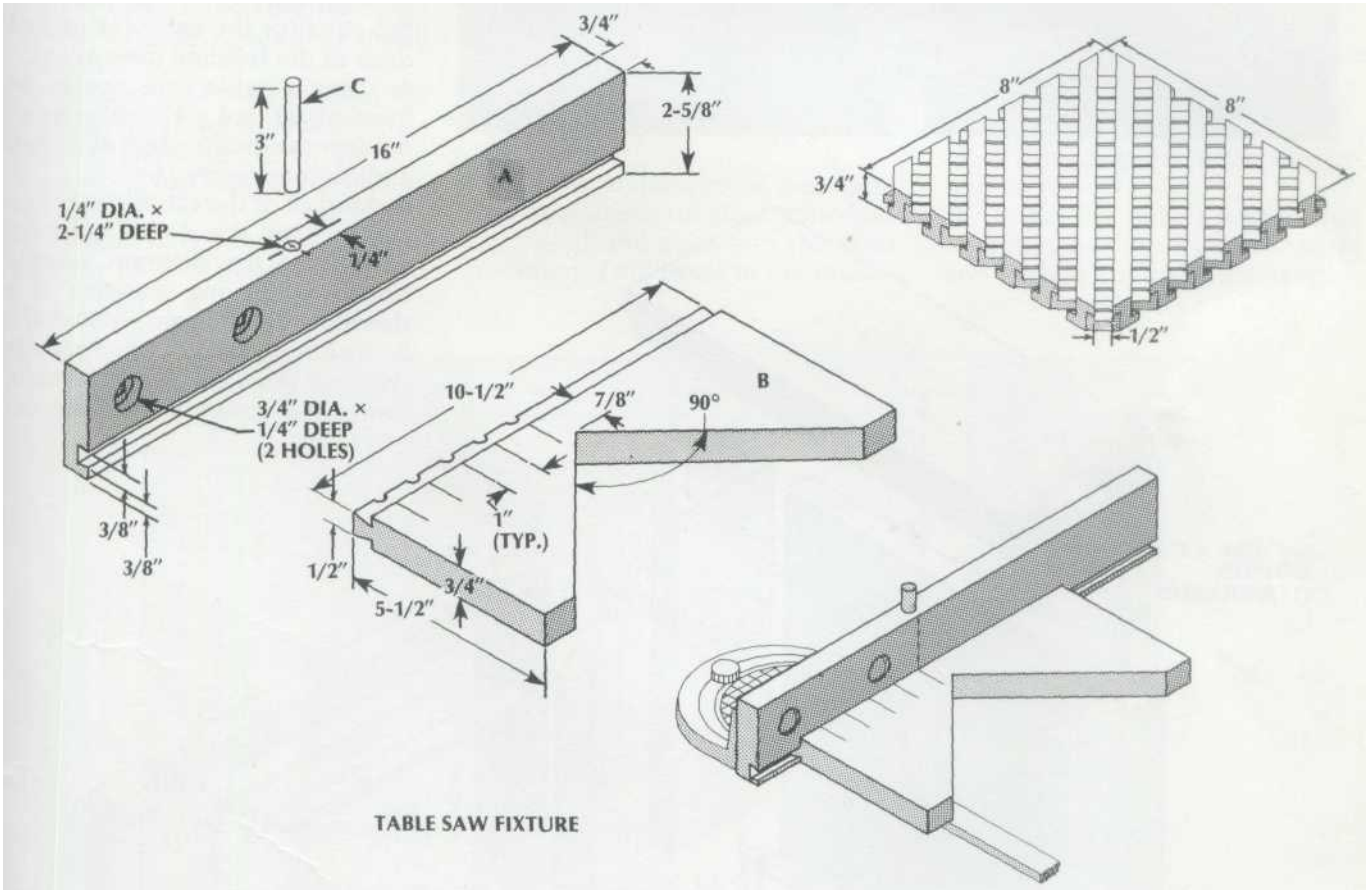
the back edge of the cradle by sliding it along the slot in the extension bar and drilling through the hole in the bar.

5. Clamp the router arm fixture on the saw table. For the table saw fixture, drill two holes in the extension bar and attach it to the miter gauge with carriage bolts and wing nuts.

MAKING THE TRIVETS

Trivets utilize 3/4"-thick stock cut into blanks of 4" x 4", 6" x 6", and 8" x 8". Only one blank at a time can be inserted into the fixture and cut.

1. If using a table saw, set dado blades to cut a 1/2" kerf. If using a router arm, use a carbide-tipped straight router bit or any decora tive bit without a pilot.
2. All cuts are 1/2" deep. Start at one corner, make the first cut, then rotate the blank 180° and cut across the other corner.
3. Remove the stop pin (C), then slide in the cradle and blank one inch. Reinsert the pin and cut the next groove. As before, turn the blank 180° and cut the second groove on the other side. Continue in this manner until you reach the middle of the blank and the top is completed.
4. Turn the blank over, rotate it 90°, and begin the same cutting procedure from corner to middle.
5. Sand the edges of the trivets with a disc sander. For overall sand ing, use flutter sheets. Use a good heat- and water-resistant finish.



LIST OF MATERIALS
(Router Arm Fixture)

(finished dimensions in inches)

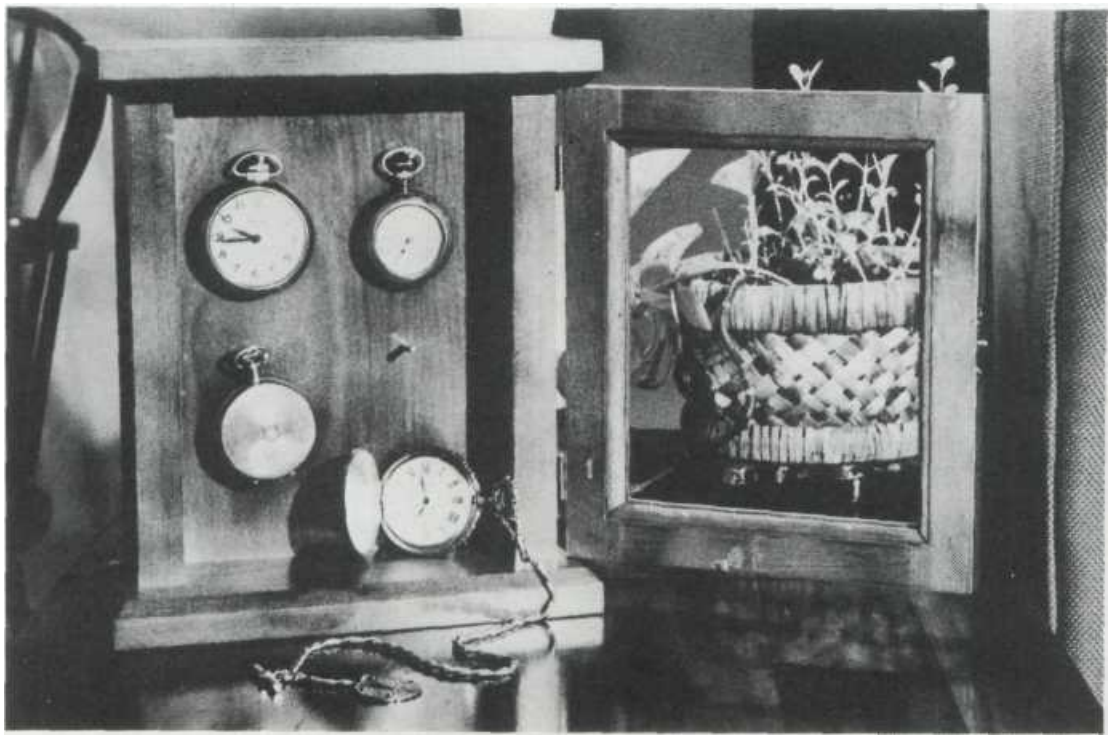
A	Extension bar	3/4 × 1-3/4 × 16
B	Cradle	3/4 × 5-1/2 × 10-1/2
C	Stop pin	1/4 dia. × 3-1/4
D	Back brace	3/4 × 1-3/4 × 29-1/2
	Flathead wood screws	#6 × 1

LIST OF MATERIALS
(Table Saw Fixture)

(finished dimensions in inches)

A	Extension bar	3/4 × 2-5/8 × 16
B	Cradle	3/4 × 5-1/2 × 10-1/2
C	Stop pin	1/4 dia. × 3
	Carriage bolts	
	Wing nuts	

WATCH KEEP



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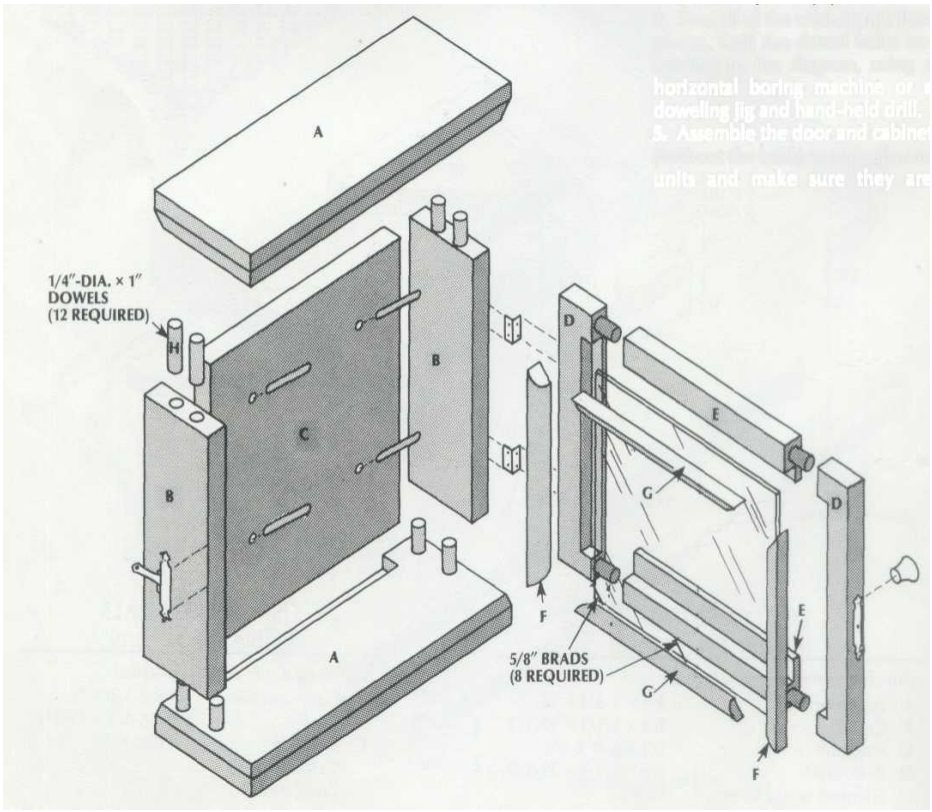


Pocket watches are a beautiful link to the past, and this watch keep is ideal for displaying these old treasures.

1. This project is constructed of 1 x 4 stock and 1/4"-radius quar ter-round molding. The material used for the cabinet sides (B) and back (C) and the door stiles (D) and rails (E) must be planed or resawn and sanded down to 1/2" thickness.
2. Begin by edge-gluing two 9" lengths of 3/4" stock to serve as the basis for the back panel. After the glue has dried on the panel, cut all the parts for the cabinet case and door to the finished dimensions.
3. Using a table saw, router, or hand plane, cut a 45° chamfer on the front and side edges of the top and bottom pieces (A).
4. Sand all of the cabinet and door pieces. Drill the dowel holes ac cording to the diagram, using a horizontal boring machine or a doweling jig and hand-held drill.
5. Assemble the door and cabinet (without the back) as two separate units and make sure they are

square. Clamp them together until the glue dries.

6. Rout a 1/4"-wide x 1/4"-deep rabbet in the back of the door, us ing a straight router bit. Square the corners using a hand chisel.

7. Cut a 1/4"-deep x 1/2"-wide x 6"-long stop rabbet in the back edge of both the top and bottom cabinet pieces.

8. Prior to installing the back, drill 1/8"-diameter holes in the back for the hanging pegs. Drill the holes at a 5° slant to the depth of 3/8". If using wooden pegs, install them; if using brass rods, wait until after fin ishing the watch keep to install them.

9. Nail and glue the back into the cabinet. Miter the ends of the glass retainer molding (F, G) for the door while you wait for the glue to dry.

10. If necessary, sand the top and bottom of the door to prevent them from rubbing or binding. Sand the sides so they fit flush with the cabinet.

11. Finish all the pieces, including the quarter-round glass retainers.

12. Install the glass with the glass retainers. Drill holes in the retainers for brads, then attach the retainers with brads.

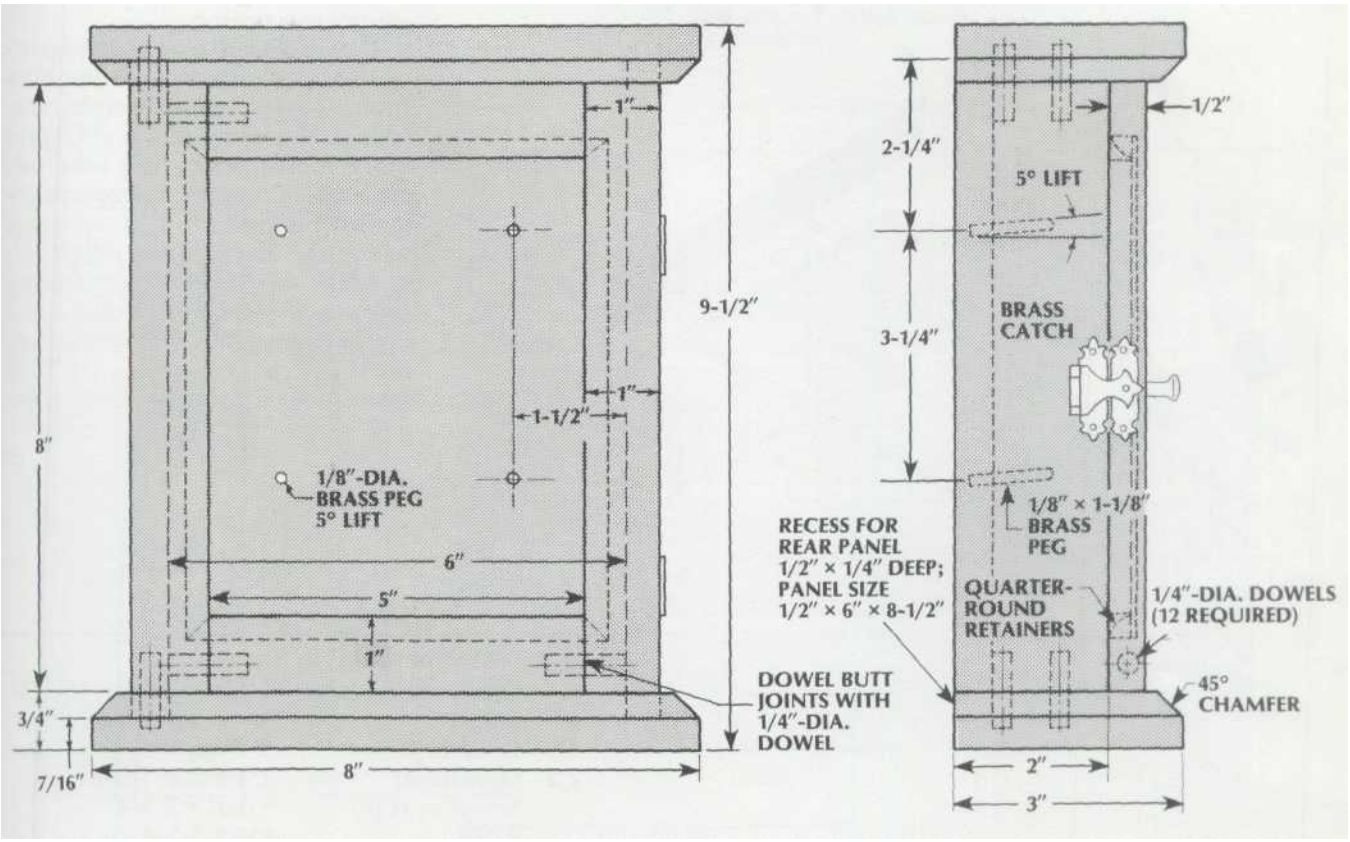
13. If using brass hanging pegs, in stall them now.

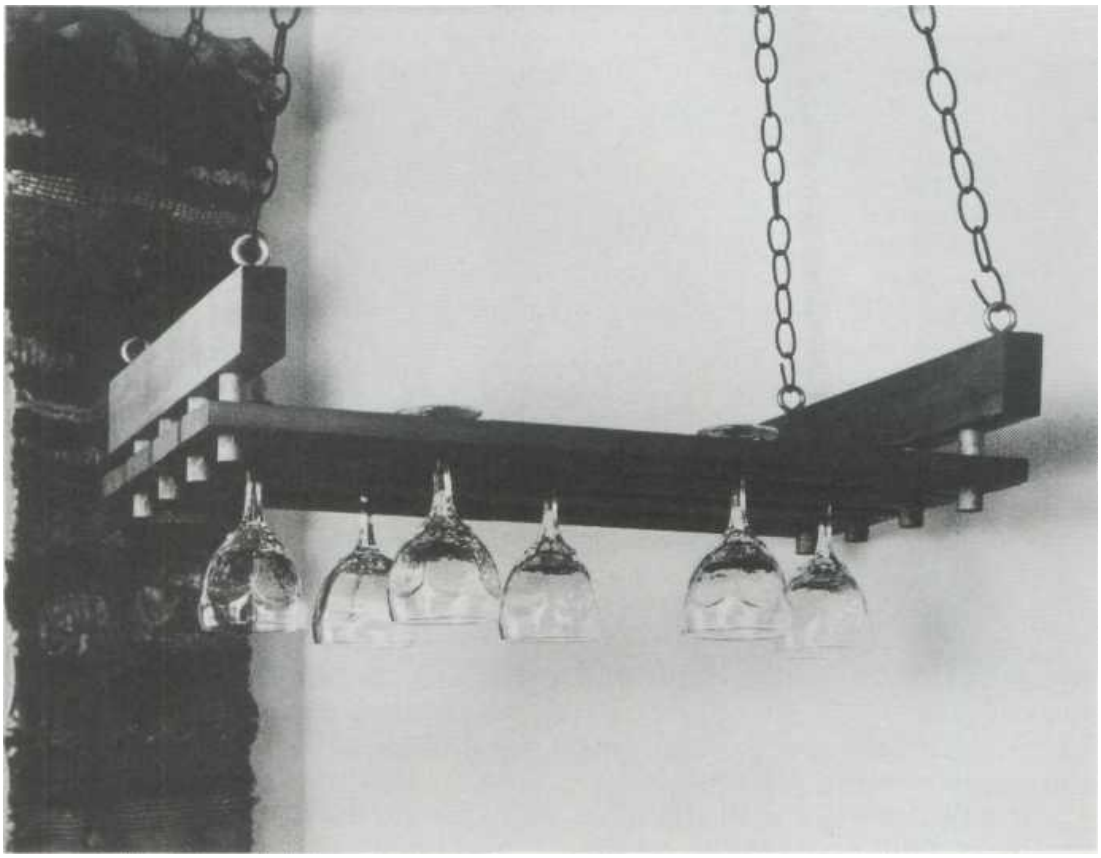
14. Install the hinges with screws to mount the door. Install the knob and latch to complete the keep.

LIST OF MATERIALS

(finished dimensions in inches)

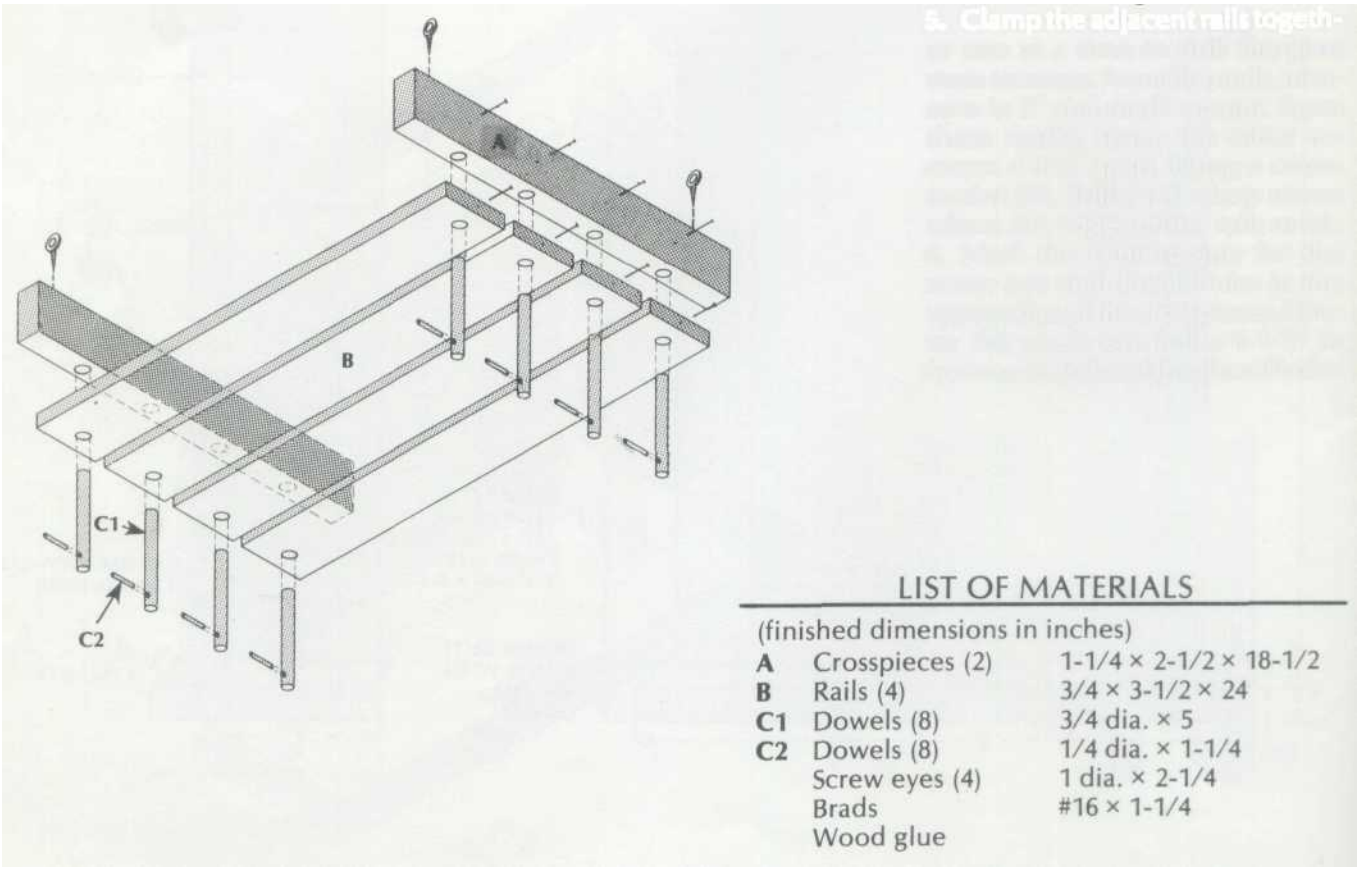
A	Top and bottom (2)	3/4 × 3 × 8
B	Sides (2)	1/2 × 2 × 8
C	Back	1/2 × 6 × 8-1/2
D	Door stiles (2)	1/2 × 1 × 8
E	Door rails (2)	1/2 × 1 × 5
F	Side glass retainers (2)	1/4 × 1/4 × 6-1/2
G	Top & bottom glass retainers (2)	1/4 × 1/4 × 5-1/2
H	Dowels (12)	1-1/4 dia. × 1
	Knob	1/2 dia.
	Hanging pegs (4)	1/8 dia. × 1-1/8
	Glass	1/8 × 5-3/8 × 6-3/8
	Brads	#18 × 5/8
	Hinge with screws (pair)	
	Door latch	
	Wood glue	





With this decorative hanging rack you can show off your fine wine glasses. It's useful in any kitchen or above any bar; it is attractive, and also helps solve your storage problems.

1. To make the wine glass rack, start with a 38" length of 2 x 4, a 49" length of 1 x 8, and two dowel rods (one 1/4" in diameter and one 3/4" in diameter).
2. Crosscut the 2 x 4 into two 18-1/2"-long pieces. Rip, then plane or sand these pieces to a thickness of 1-1/4" and a width of 2-1/2" to make the crosspieces (A).
3. Crosscut the 3/4"-thick stock into 24"-long boards, then rip these boards into 3-1/2"-wide pieces for the rails (B).
4. Cut the 3/4"-diameter dowel rod (C1) into eight 5"-long pieces. Cut the 1/4"-diameter dowel rod (C2) into eight 1-1/4"-long pieces. To make sure that the pieces are the same length, use a stop block when crosscutting.
5. Clamp the adjacent rails together two at a time to drill the glass stem recesses. From the ends, mea sure in 3" and mark a point. From these marks, space the other re cesses 4-1/2" apart. Using a coun tersink bit, drill a 1/4"-deep recess where the edges of the rails meet.
6. Mark the centerpoints for the screw eye and dowel holes in the upper edge of the crosspieces. Cen ter the screw eye holes 1-1/2" in from each end and the dowel holes



LIST OF MATERIALS

(finished dimensions in inches)

A	Crosspieces (2)	1-1/4 × 2-1/2 × 18-1/2
B	Rails (4)	3/4 × 3-1/2 × 24
C1	Dowels (8)	3/4 dia. × 5
C2	Dowels (8)	1/4 dia. × 1-1/4
	Screw eyes (4)	1 dia. × 2-1/4
	Brads	#16 × 1-1/4
	Wood glue	

3-1/4" in from the ends and 4" apart. Mark the dowel hole centers 1" from the ends and midway across the lower faces on the rails.

7. Drill pilot holes for the screw eyes 1" deep into the crosspieces. Drill 3/4"-diameter dowel holes completely through the cross-pieces and the rails. To avoid tear-out when drilling the dowel holes, drill only until the tip of the bit penetrates the far side of each piece, then flip the piece over to complete the hole.

8. Center and drill a 1/4"-diameter hole through each 3/4"-diameter dowel 5/8" from one end. Hold the dowels steady for drilling by plac ing them in a V-groove plowed down the middle of a block of scrap lumber. Position the block so that the drill bit will strike the cen ter of the groove, then clamp it to the table or hold it firmly against a fence.

9. Sand all pieces before assem bling.

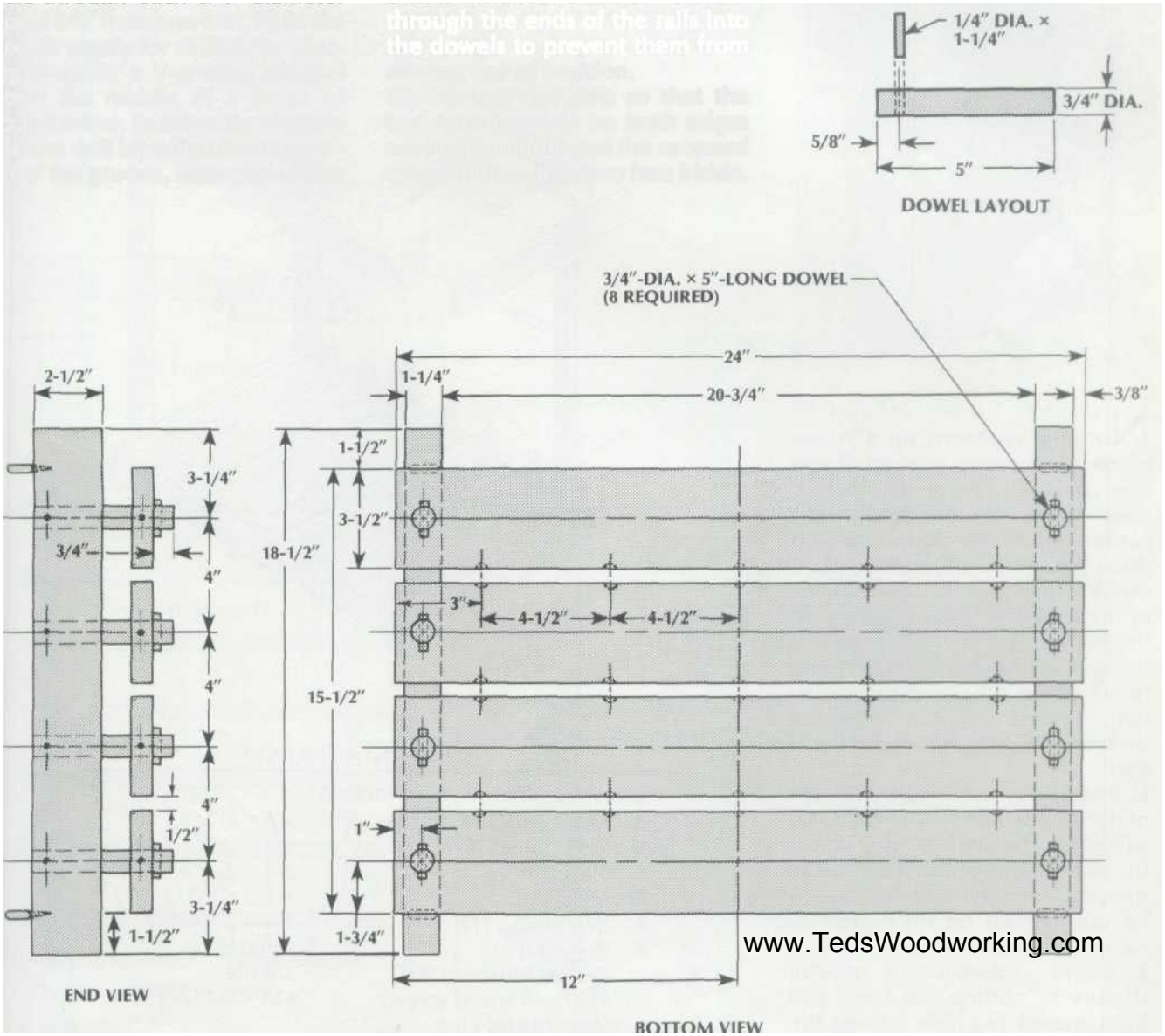
10. Drive the 1/4"-diameter dowels through the ends of the larger dowels so that their ends extend the same distance to either side. Then fit the rails onto the larger dowels and push them down until they are stopped by the smaller dowels.

11. Make sure the rails are turned so that the tapered recesses on their edges will face up when the unit is installed. Then drive brads through the ends of the rails into the dowels to prevent them from moving out of position.

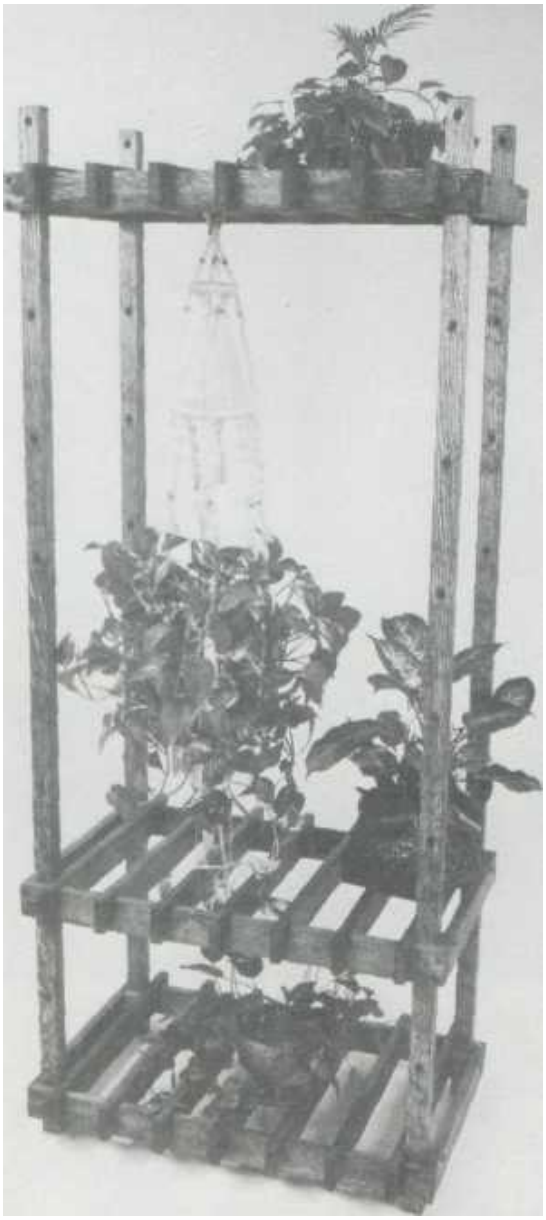
12. Arrange the rails so that the two with recesses on both edges are in the middle and the recessed edges of the other two face inside. Spread glue inside the dowel holes in the crosspieces and the upper ends of the dowels. Then insert the dowels into the underside of the crosspieces, pushing them up until their upper ends barely emerge from the crosspieces. After the glue dries, sand the dowel ends flush with the crosspieces.

13. If you want to stain the assem-bly, do it at this time, then rub with steel wool.

14. Finally, install the screw eyes and hang the rack.

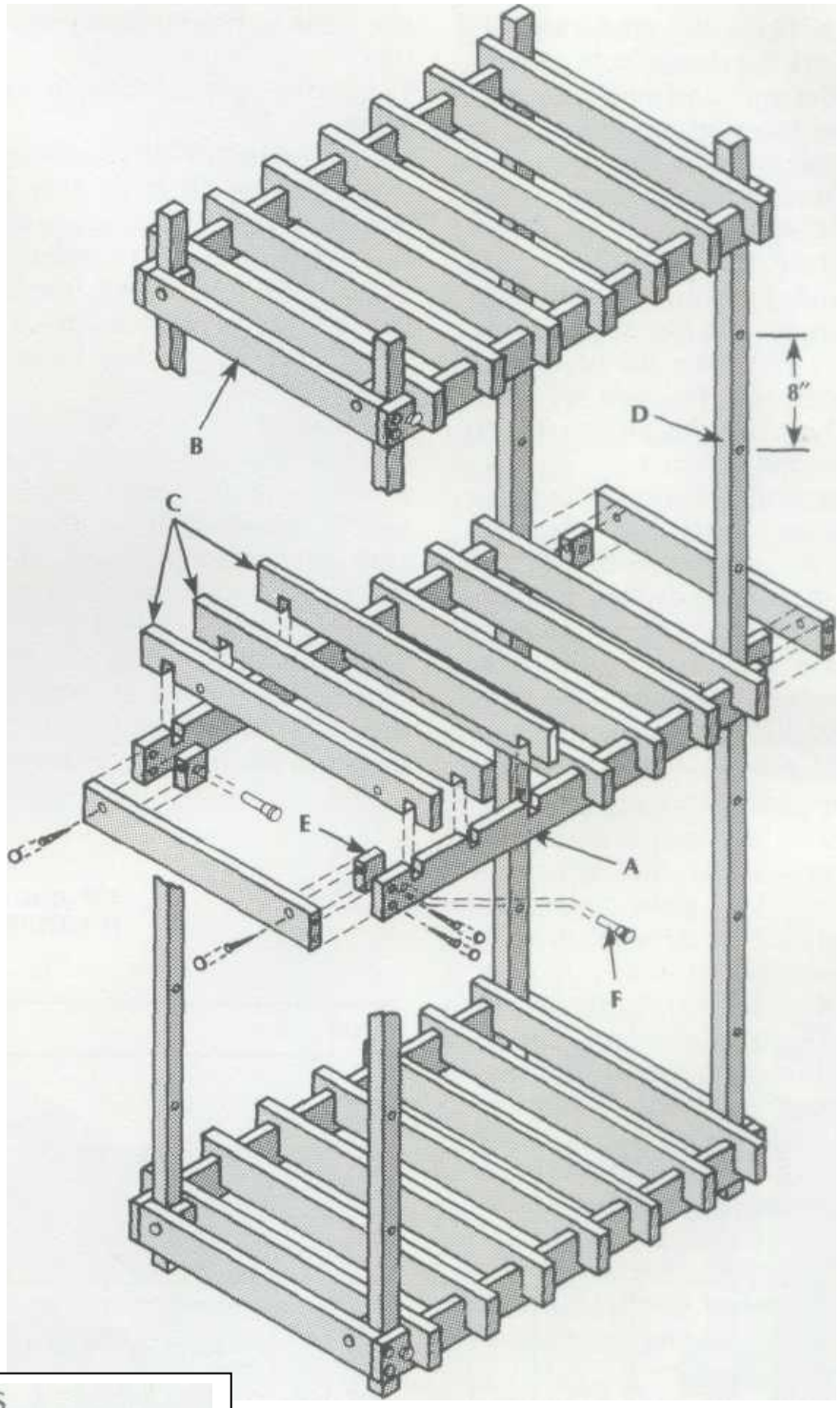


ADJUSTABLE PLANT SHELVES



Nothing brightens up a home better than a hanging plant. If you have a south-facing window or glass doors, you can bring your garden indoors for the winter with these attractive adjustable plant shelves. The shelves are slatted rather than solid so that the plants on the bottom can receive more light. If you build the shelves with cedar, redwood, or other weather-resistant lumber, you can keep the shelves outdoors during the summer.

1. Begin by measuring the window or door opening next to which you will place the shelves, and adjust the dimensions of the materials as needed. Keep in mind that the to tal unit should be no higher or wider than the window or door.
2. Begin construction of the shelves by cutting the front and back frames (A), side frames (B),
3.



LIST OF MATERIALS

(finished dimensions in inches)

A	Front and back frames (6)	3/4 × 2-1/2 × 30
B	Side frames (6)	3/4 × 2-1/2 × 17
C	Slats (21)	3/4 × 2-1/2 × 21-1/2
D	Stiles (4)	1-1/2 × 1-1/2 × 72
E	Peg blocks (12)	3/4 × 2 × 1-1/2
F	Pegs (12)	1 dia. × 2-1/2
	Dowel buttons (36)	3/8 dia.
	Flathead wood screws	#10 × 1-1/2
	Waterproof glue	

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slats (C), and peg blocks (E) to size from 1 x 3 stock.

3. The slats and the front and back frame members are joined togeth er using cross lap joints as shown in the exploded-view drawing. These joints are formed by cutting 3/4"-wide dadoes 1" deep in both sets of pieces.

4. Lay out and cut the dadoes on the front and back frames as shown in the front frame and shelf layout drawings. Note that the middle dado is centered along the length of the frames and that all dadoes are 3-3/8" apart.

5. Lay out and cut a pair of dadoes on each slat as shown in the slat detail drawing. Note that these da does are set 1-1/2" from the ends of the pieces.

6. Drill 1/2"-diameter peg holes through the front frames and back peg blocks. The holes in the front frames are centered 1" below the upper edge and 1-1/2" from each end. The holes in the blocks are centered on both width and length. Counterbore screw holes in the front and back frames, side frames, and the outermost slats of each shelf. Then sand all the shelf pieces.

7. Assemble the frames, using wa terproof glue and #10 x 1-1/2" flat-head wood screws. Do not glue in the five middle slats of the top shelf; with these slats left unglued and detachable it is much easier to put up and take down your plants.

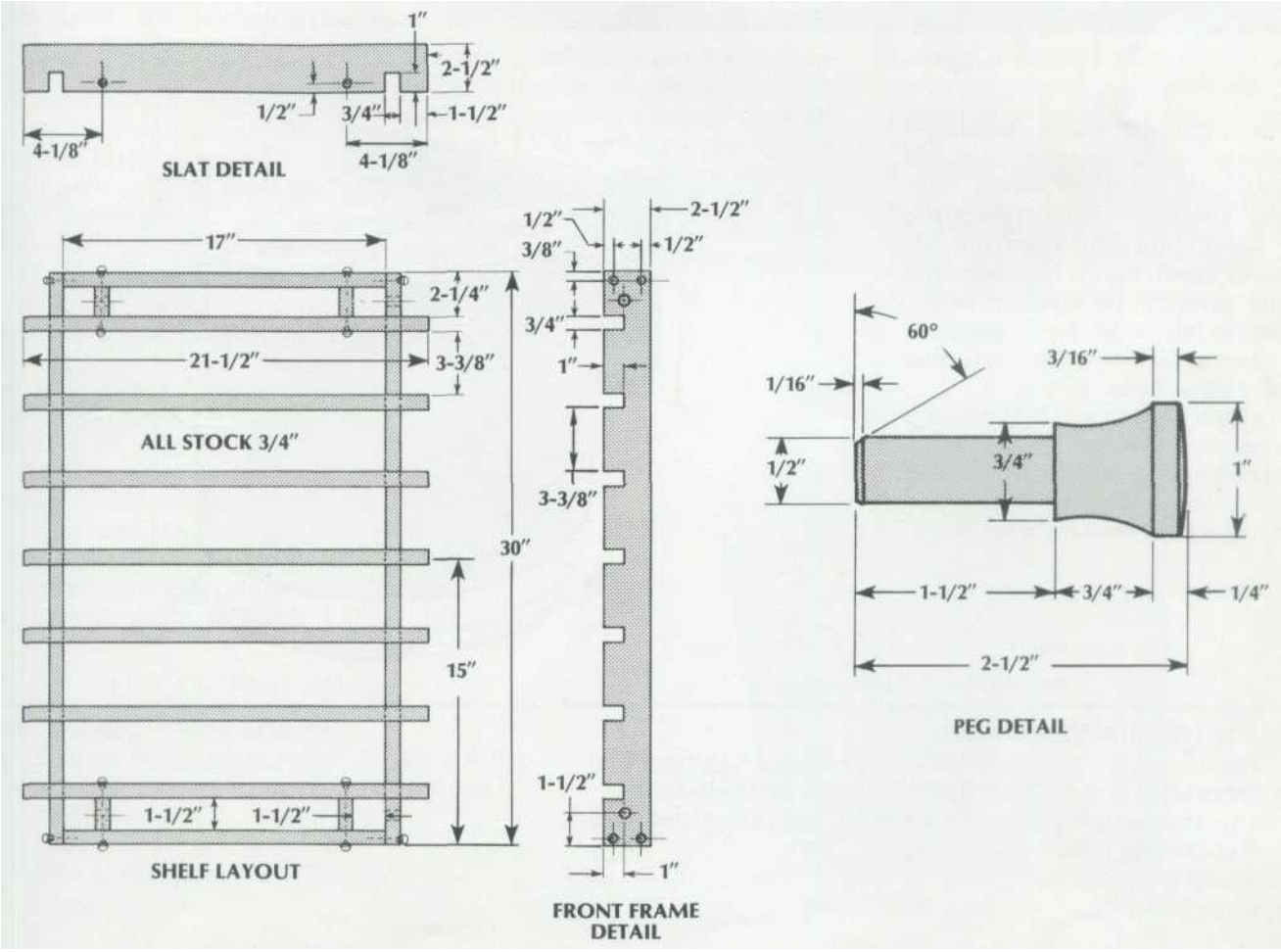
8. Cover the counterbored screws with 3/8"-diameter dowel buttons.

9. Cut the four stiles (D) from 2 x 2 stock. Center and drill 1/2"-diame-ter peg holes at 8" intervals along the length of each stile, beginning 4" from either end. Sand the stiles.

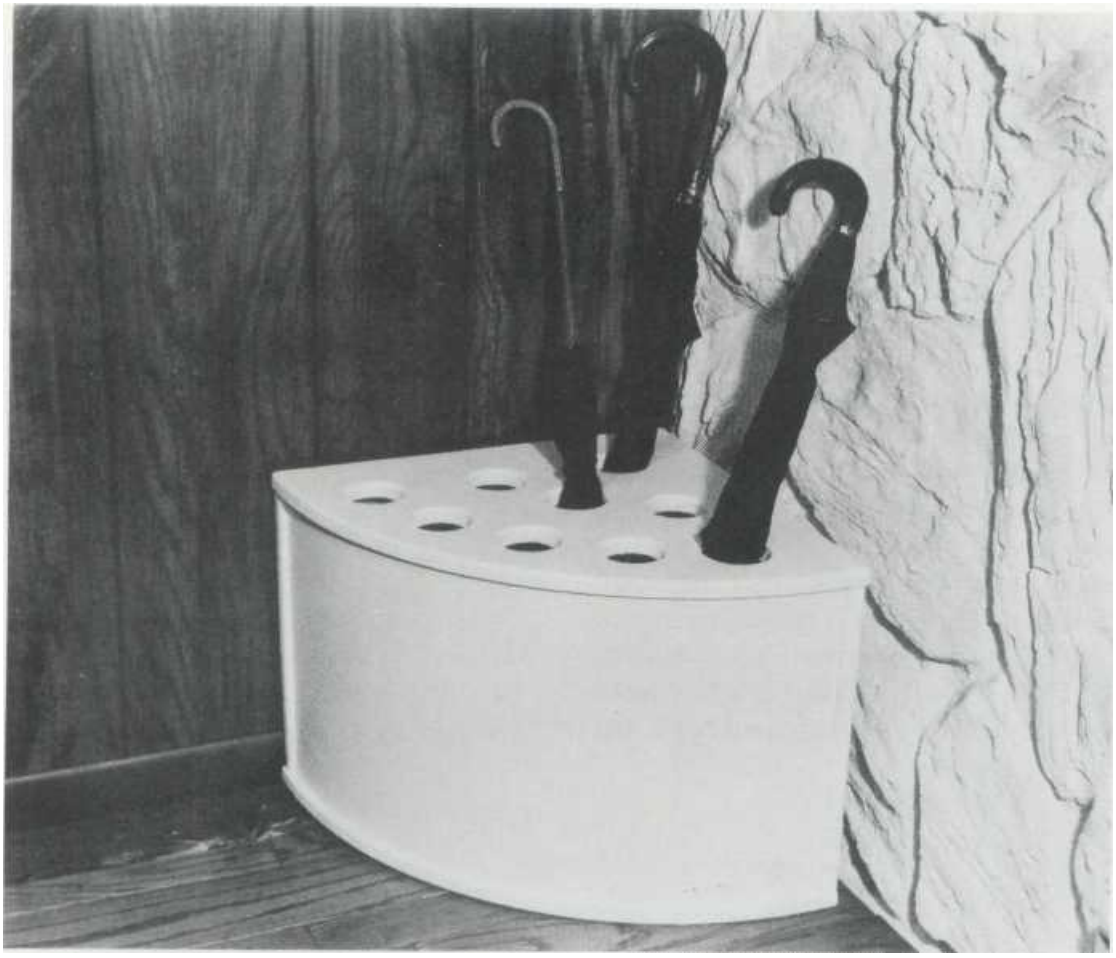
10. Turn the pegs (F) on a lathe from scrap 2 x 2 stock to the profile shown in the peg detail. Sand and finish the pegs on the lathe.

11. If you are planning to use the shelves outdoors, finish with a good outdoor finish such as spar varnish or polyurethane. (If you used ce dar, redwood, or weather-resistant lumber, no finish is necessary.)

12. Finish the assembly by sliding the shelves over the ends of the stiles. Position the shelves and se cure them with the pegs.



CORNER UMBERELLA STAND



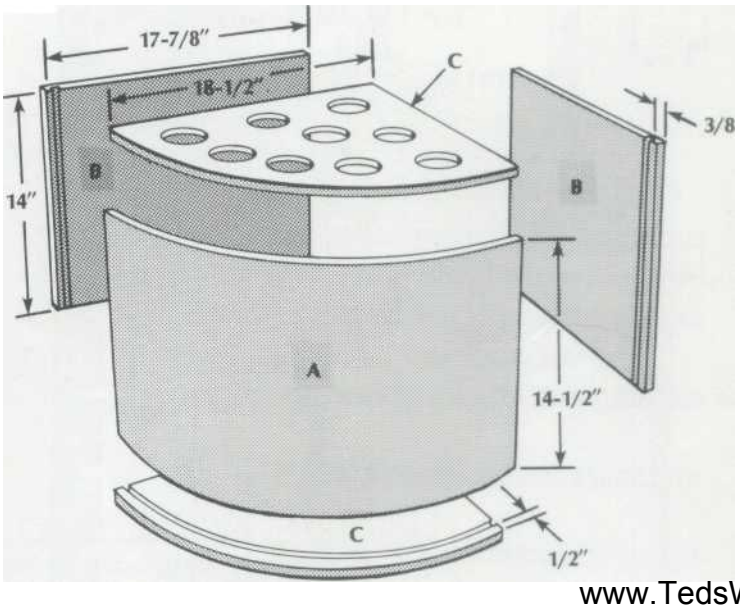
The umbrella stand described here was built of particleboard and hardboard, then covered with white latex paint. The hardboard is the ideal choice for the front because it bends easily. However, the other parts can be made of waferboard or plywood, if you prefer.

1. Cut the pieces to size according to the dimensions given.
2. Lay out and cut an 18-1/2" radius across the front corner of the top and bottom pieces (C). Then rout a 1/8"-wide x 1/4"-deep groove in each piece to receive the front (A). Set the grooves 1/2" back of the radiused edges of the pieces.
3. Rout a 1/8"-wide x 1/4"-deep dado across each side piece (B) 3/8" in from the front edge to receive the ends of the front panel.
4. Lay out and cut nine 2-1/2"-diameter holes in the top, arranged as shown in the drawing. Sand the edges of the holes and any other rough edges on any of the pieces.
5. Dry assemble the stand to check the fit. Keep the outside faces of the sides flush with the straight edges of the top and bottom. Trim one end of the front panel if necessary to get a good fit.
6. Run a bead of glue inside the grooves and dadoes and along all edges where parts will join. Assemble the stand, using 4d finishing nails to fasten the top and bottom to the sides while the glue dries.
7. Finish the stand with two coats of latex paint.

LIST OF MATERIALS

(finished dimensions in inches)

A	Front	1/8 × 14-1/2 × 28-1/2 hardboard
B	Sides (2)	1/2 × 14 × 17-7/8 particleboard
C	Top and bottom	1/2 × 18-1/2 × 18-1/2 particleboard
	4d finishing nails	
	Wood glue	
	Latex paint	



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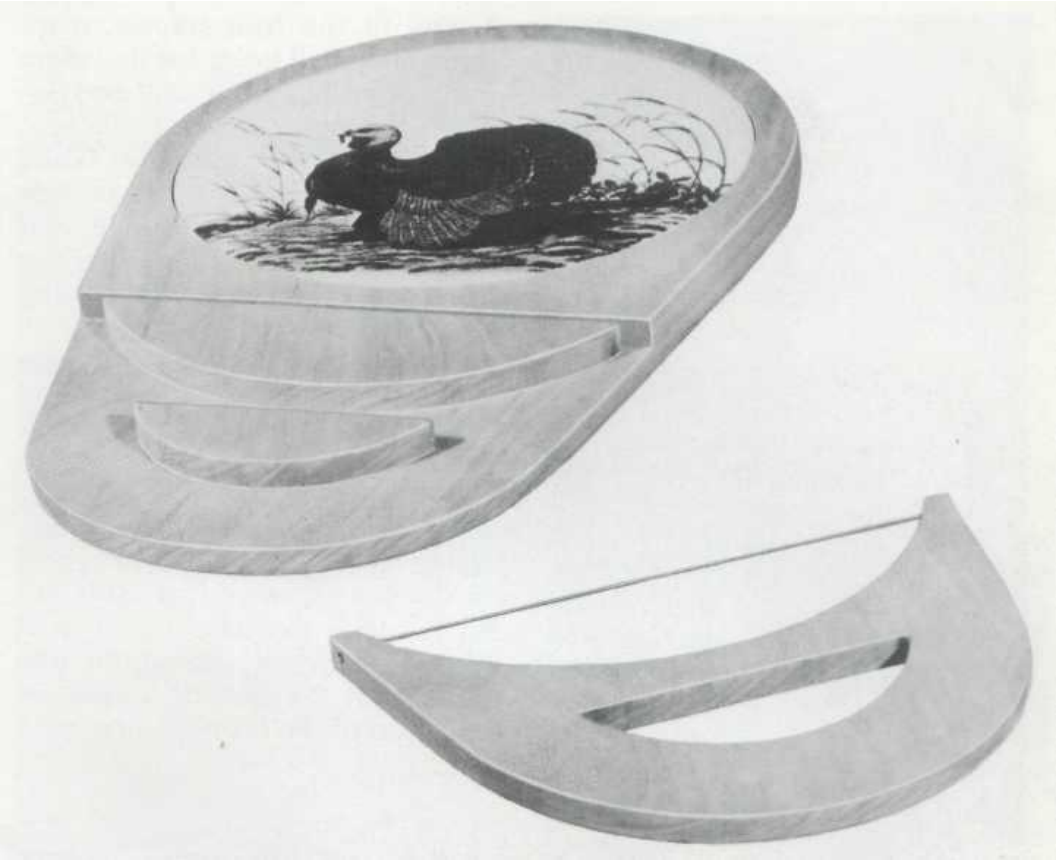
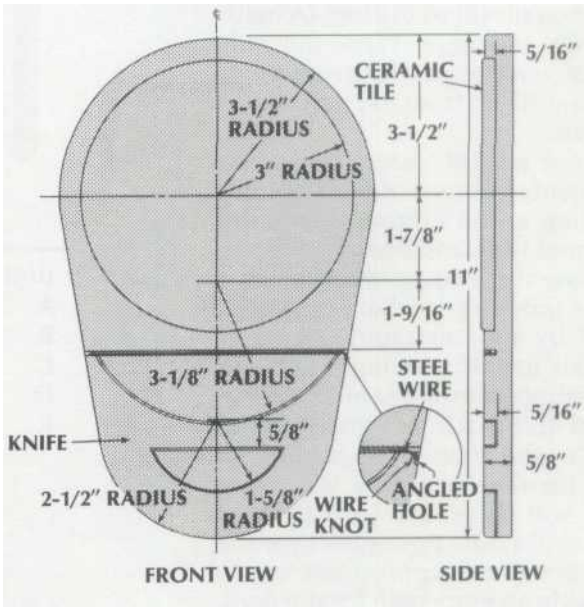
CUTTING BOARD



A brightly colored, round ceramic tile makes the perfect working surface for this wooden cutting board. As an added attraction, the wire bladed knife is designed to fit right into the board, so it's at your fingertips when you need it.

1. The cutting board is made from two 7" x 11" pieces of maple or cherry. Begin the project by resawing or planing both boards to 5/16" in thickness and trimming them to the overall shape shown in the drawing.
2. Leave one board whole to serve as the base. Cut the knife handle, the two knife holders, and the opening for the tile out of the other piece following the instructions given in the drawings. Adapt the dimensions as needed to fit the precise dimensions of your ceramic tile.
3. Since the pieces cut out of the knife handle are used as the knife holders, the cuts must be made with minimal waste. Begin by drilling a tiny hole through the piece on one cutting line and slipping a jeweler's blade through. Then fasten the blade in a scroll saw and complete the cut.
4. Use glue to fasten the tile holder and knife holder pieces to the cutting board base, clamping the pieces until the glue dries. Use the knife handle to properly position the knife holder pieces, but be careful not to accidentally glue it in place.
5. When the glue has set, sand the cutting board and knife handle with fine sandpaper to round all sharp corners.
6. Use an unwound steel musical instrument string for the knife blade. Drill holes for the wire diagonally through the tips of the knife handle to minimize chances of the wood splitting when the wire is tensioned. Counterbore the outside ends of the holes slightly to make room for the anchor on one end of the string and the knot on the other end.
7. Stain if desired, then apply one or two coats of polyurethane or penetrating oil finish for protection.
8. Attach three small tack feet to the bottom of the cutting board to prevent it from sliding when in use. Install the tile, and the board is ready for use.



LIST OF MATERIALS

(finished dimensions in inches)

A	Cutting board blanks (2)	5/16 x 7 x 11
	Ceramic tile	3/8 x 6 dia.
	Steel wire	
	Tack feet	
	Fine sandpaper	
	Wood glue	

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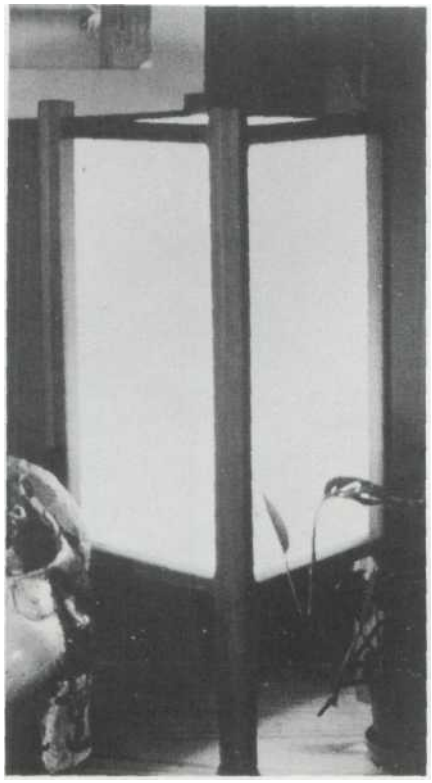
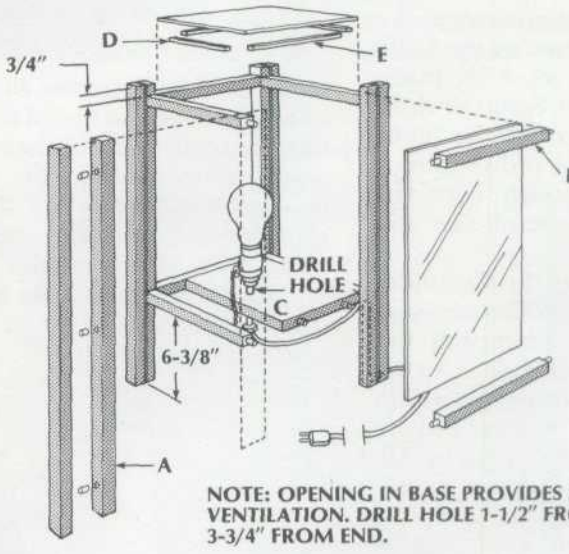
SHOJI LAMP



This lantern-style lamp and shoji screen can be used indoors or out. It's constructed easily with glue and small brads; however, remember to nail carefully to avoid splitting the wood.

1. After cutting all the pieces to size, assemble the frames by attaching the rails (B) to the legs (A) with dowels and glue. Place the rails 3/4" down from the tops of the legs and 6-3/8" up from the bottoms as shown.
2. Rout a 6-1/4"-long channel up the center of one of the legs, beginning at the bottom. Make the channel wide and deep enough to enclose the lamp cord and place it on an outside edge that can be covered by an overlapping frame as shown in the drawing. Then, on the adjacent inside face of the leg, drill a hole that intersects the upper end of the channel to provide an exit for the cord. Pick the frame that will cover the cord channel and drill a hole through it near the bottom of the appropriate leg to provide an entry path for the cord.
3. Dry fit the four frames, mark them, and drill holes for doweling them together. Then sand and finish the frames as desired.
4. Cut a piece of fiberglass fabric large enough to cover the rectangular opening in each frame. Fasten the fiberglass panels to the inner face of each frame using small wire nails.
5. Drill a hole through the base (C), centered along its length and 1-1/2" from one side. Size the hole to accept the pipe nipple found in the lamp socket kit.
6. Fasten the base between the frame with the cord channel and one other frame using dowels and glue. Make the base side that is farthest from the pipe nipple hole flush with the outside edges on one side of the frames to create a ventilation and access space on the other side.
7. Lace the lamp cord through the holes and channel in the two frames, pulling enough out the upper end for connecting with the socket. Fasten the four frames together using glue and dowels. Then glue and tack the support strips (D, E) to the backs of the upper rails, keeping their lower edges flush.
8. Insert the pipe nipple into the base, keeping the nut on the lower end. Run the cord up through the nipple and fasten it to the socket, then mount the socket on the nipple. Rotate the socket to place the pull chain side next to the ventilation hole, then tighten the nut.
9. Cut a piece of fiberglass to serve as the top of the lamp. Glue and tack it to the top edges of the support strips.



NOTE: OPENING IN BASE PROVIDES ACCESS AND VENTILATION. DRILL HOLE 1-1/2" FROM EDGE, 3-3/4" FROM END.

LIST OF MATERIALS

(finished dimensions in inches)

A	Legs (8)	3/4 × 3/4 × 24
B	Rails (8)	3/4 × 3/4 × 7-1/2
C	Base	3/4 × 6 × 7-1/2
D	Support strips (2)	5/16 × 1/2 × 7-1/2
E	Support strips (2)	5/16 × 1/2 × 8-3/8
	Dowels	3/8 dia. × 1-1/2
	Wire nails	
	Lamp socket kit (socket, pull chain, cord, pipe nipple, and nut)	
	Fiberglass fabric	
	Wood glue	

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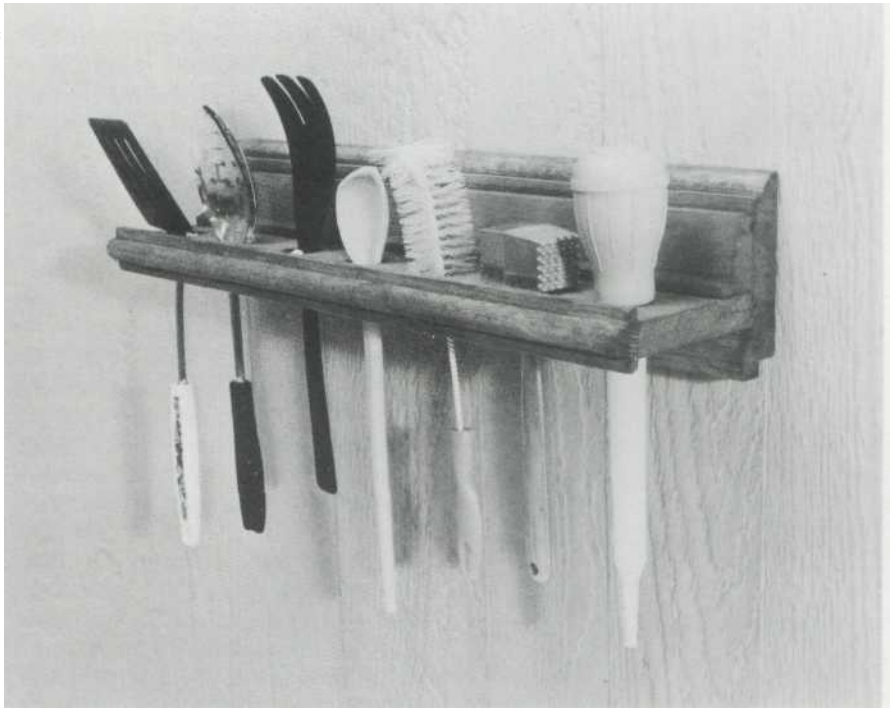
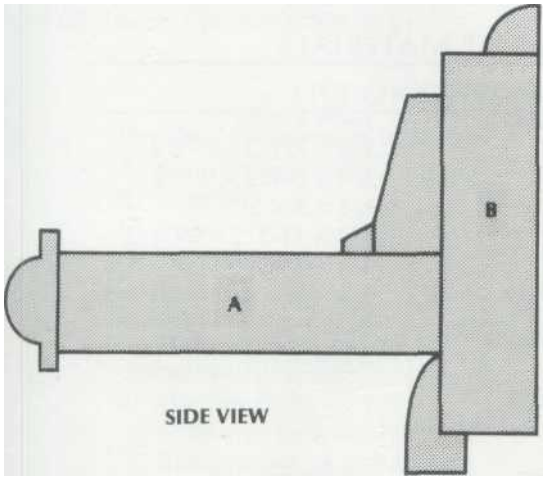
UTENSIL HOLDER



kitchen utensils have a way of getting lost just when you need them. Such confusion can be avoided by building this special holder for them.

1. Cut the rack (A) and base (B) to size.
2. Drill appropriately sized holes in the rack to accommodate large spoons and other utensils.
3. Glue and tack a piece of decora tive molding to the front of the rack as shown.
4. Butt the rack against the base, or rout a shallow groove for it. Fasten them together using glue and screws inserted from behind.
5. Dress up the holder by nailing various moldings to the front, top, and bottom edges of the base. The ones used on the original are pro filed below, but choose moldings to suit your own taste.
6. Finish the holder as desired, then mount it on the wall or the side of a cabinet.



LIST OF MATERIALS

(finished dimensions in inches)

A	Rack	3/4 × 3-1/2 × 12
B	Base	3/4 × 3-1/2 × 12
	Wood screws	
	Finishing nails	
	Decorative moldings	
	Wood glue	

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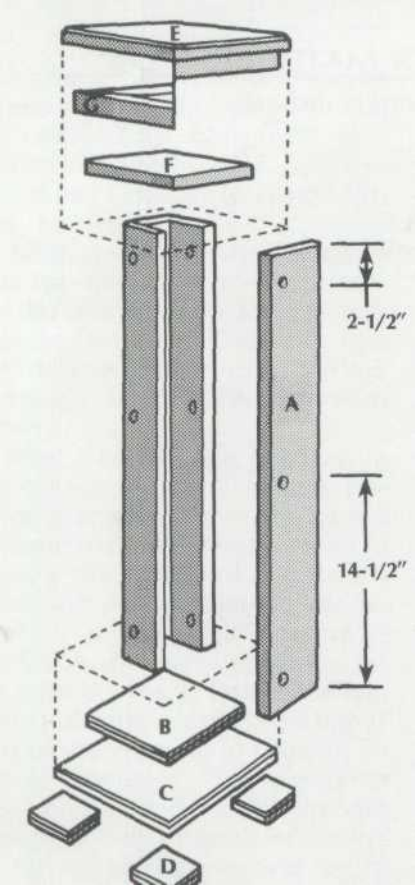
PLANT STAND

Here's a handsome pedestal to display your favorite plant. The original was made of clear grade redwood. The wider pieces were glued up from narrower stock and custom cut to the dimensions listed.

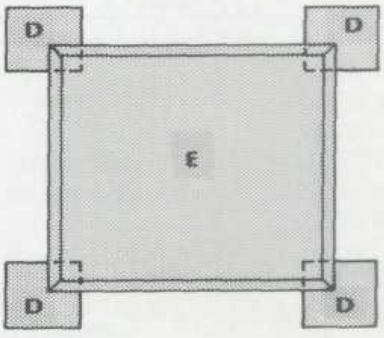
1. Cut all of the pieces to size ac cording to the dimensions given.
2. Cut three plug holes in each col umn side (A) as shown. Locate the holes 2-1/2" from each end, with the remaining hole in between. All of the holes should be centered 3/8" from one edge of the piece.
3. Drill pilot holes for the wood screws in the center of the plug holes.
4. Assemble the column by gluing and screwing one corner at a time. Be sure that the assembly is square.
5. Round the edges of the column by sanding or routing with a 1/4" radius bit.
6. Cut 45° miters at the corners of the apron pieces (G).
7. Round or bead the upper edges of the top (E), then center the apron pieces on the underside of the top. Glue and screw through the apron into the top.
8. Center the bracket (F) on the column; then glue and screw it in place. Center the top/apron as sembly on the bracket; glue and screw through the bracket into the apron.
9. Round or bead the upper edges of the base pieces (B, C) and feet (D); then sand.
10. Center the small base piece on the bottom of the column. Glue and screw it in place from under neath. Repeat with the large base piece.
11. Position the feet so they ex tend beyond the corners of the base as shown; secure with glue and screws.
12. Sand the completed plant stand; finish as desired.



LIST OF MATERIALS

(finished dimensions in inches)

A	Column sides (4)	3/4 × 4 × 29
B	Base piece	3/4 × 7-1/2 × 7-1/2
C	Base piece	3/4 × 9-1/2 × 9-1/2
D	Feet (4)	3/4 × 3 × 3
E	Top	3/4 × 11-1/2 × 11-1/2
F	Bracket	3/4 × 7 × 7
G	Apron pieces (4)	3/4 × 3/4 × 10-1/2
	Flathead wood screws	#6 × 1-1/4
	Wood plugs	3/8 dia.
	Wood glue	

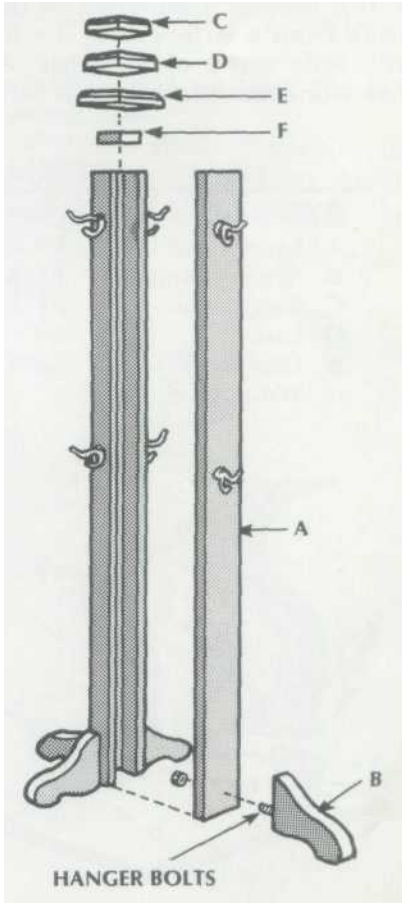


FOOT DETAIL

HALL TREE

You'll always have a place to hang your hat with this easy-to-build hall tree. And by replacing the brass hooks with pot clips, you can turn it into a plant pole that is perfect for hanging vines. Either way, it's a useful addition to any home.

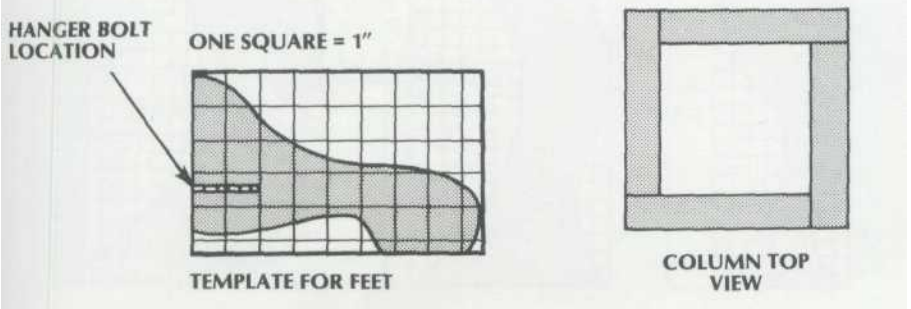
1. Begin by cutting all pieces to the listed dimensions.
2. Arrange the column sides (A) so their edges chase one another, creating a square column. Counterbore pilot holes and fasten the column sides together using wood glue and flathead wood screws. Fill the holes with wood plugs. (To avoid counterboring and plugging, use finishing nails instead of screws.) Sand the column, making the plugs flush with the other surfaces.
3. Center and drill a 5/16"-diameter hole through each column side 1-1/2" from the bottom to allow insertion of hanger bolts.
4. Lay out the final shape for the feet (B) using the template provided. Drill 7/32"-diameter pilot holes for the hanger bolts in the back edge, then cut out the feet. Round over all edges except those that will meet the column.
5. Chamfer the upper edges on each of the three top pieces (C, D, E), then attach them to the bracket (F) using wood glue and finishing nails. Begin by fastening D to C, then E to D, and finally F to E. Make sure the smaller pieces are centered on the larger ones.
6. Round over the corners of the column and the sharp lower edges on the largest top piece. Spread glue on the bracket edges and fit it inside the upper end of the column.
7. Finish the tree and the feet as desired.
8. Screw the hanger bolts into the feet, then mount them on the tree, securing them with lock washers and nuts.
9. Install brass hooks and the tree is ready for your hats and coats.



LIST OF MATERIALS

(finished dimensions in inches)

A	Column sides (4)	3/4 × 4 × 63
B	Feet (4)	1-1/2 × 5-1/2 × 8-1/2
C	Top	3/4 × 4-1/4 × 4-1/4
D	Top	3/4 × 5-3/4 × 5-3/4
E	Top	3/4 × 7-1/4 × 7-1/4
F	Bracket	3/4 × 3-1/4 × 3-1/4
	Flathead wood screws	#8 × 1-1/4
	3d finishing nails	
	Hanger bolts	1/4 dia. × 2-1/2
	Nuts and lock washers	
	Brass hooks or pot clips	
	Wood plugs	3/8 dia.
	Wood glue	



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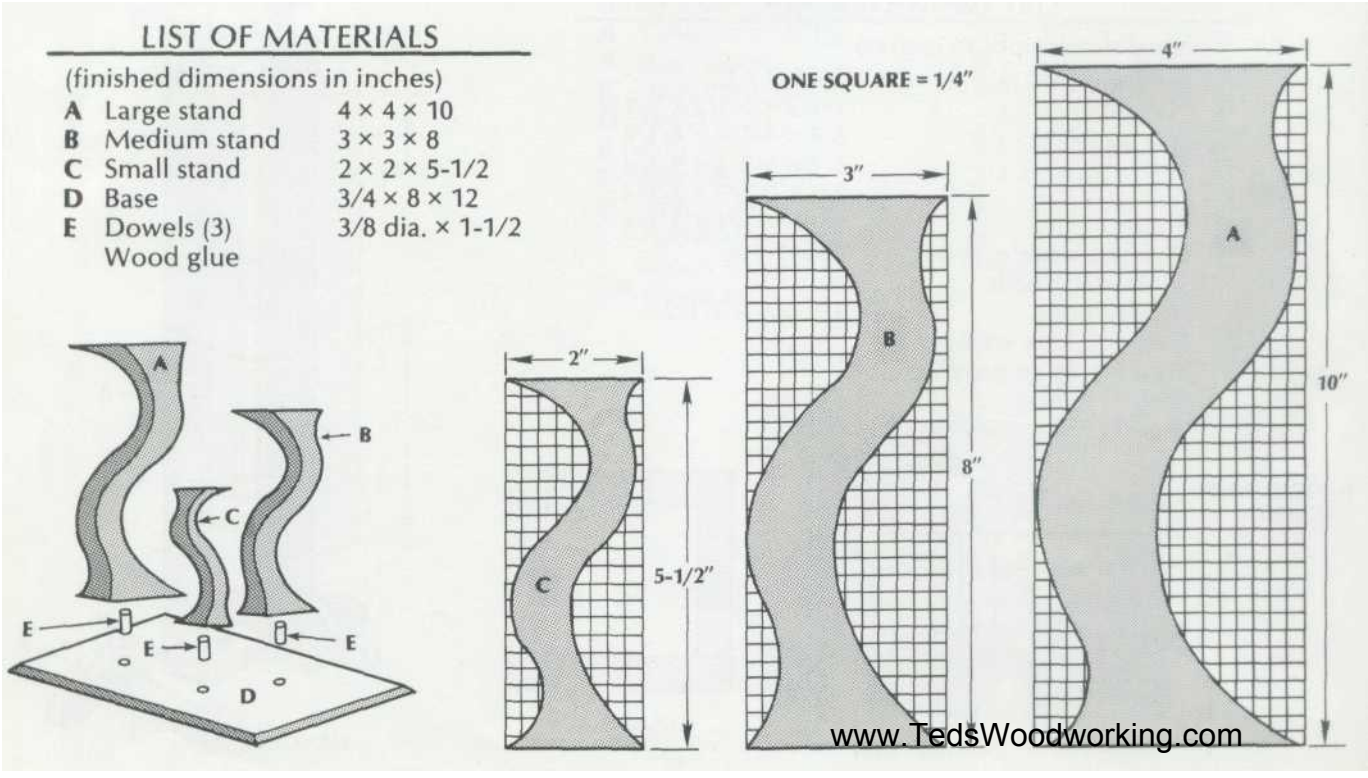
CANDLE STANDS

Candles lend elegance and beauty to any occasion, and these attractive wooden candle stands will enhance all your candlelit moments.

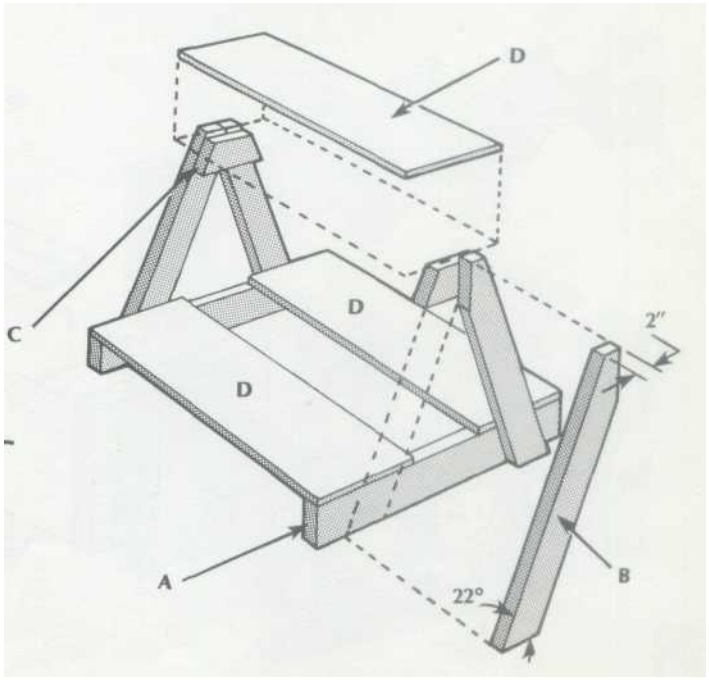
1. This project is designed to be made from a 6' length of 1 x 10 with little waste of materials. A dark wood, such as walnut, is particularly nice, but pick the material you prefer.
2. Begin by cutting off a 12-1/2" length for the base (D). To minimize cupping, rip this piece into two or three pieces, square the edges, then glue the pieces back together, alternating the direction of the growth rings from piece to piece.
3. Next, cut a 33" length from the board. Rip the piece down the middle, then cut each half into three equal lengths. Face laminate the six pieces to create a blank for the large stand (A).
4. Rip a 2-1/4"-wide piece off the remainder of the board. Cut it into three equal lengths. Face laminate the three pieces to create a blank for the small stand (C).
5. Rip the rest of the board down the middle, then cut two equal lengths out of each half. Face laminate the four pieces to create a blank for the medium stand (B).
6. After the glue has dried, square up the four sides of each block. Cut the blocks to the finished dimensions in the list, then sand both ends smooth on each. Center and drill 3/8"-diameter holes 3/4" deep into the bottom of each for later mounting on the base.
7. Make full-size templates for the blocks out of stiff cardboard or thin plywood. Trace the pattern onto two adjacent sides of each block.
8. Cut the blocks to their final shape on a bandsaw. Cut carefully along the lines on one face, then tape the waste back in place, flip the block 90°, and cut along the lines on the other marked face.
9. Cut the base to its final width and length, beveling the edges in about 15° toward the upper face.
10. Arrange the stands on the base and mark their position. Center and drill 3/8"-diameter holes through the base at the appropriate points for inserting the mounting dowels (E).
11. Sand the stands and base smooth, then assemble using glue and 3/8"-diameter dowels. After the glue dries, remove any dowel protruding through the bottom of the base. Apply your choice of finish.



STEPLADDER ~~PLANT~~ STAND

If space is a problem around your home, this handy little plant stand could be the answer. The two bottom shelves provide ample space for small and medium size plants, while the top shelf can accommodate plants of slightly larger size.

1. Cut all the pieces to size according to the dimensions given.
2. Cut a 22° bevel on each end of each leg (B) so that, when installed, the legs will slant in but their ends will remain parallel.
3. Measure from the outside edge 2" across the beveled end at the top of each leg and square a line down from that point. Cut along those lines to create the joints between legs shown in the drawing.
4. Place a pair of legs together on a flat surface and lay a brace (C) across their upper ends. Adjust the brace so that its upper edge is parallel to and 3/4" below the upper ends of the legs. Mark and trim the ends of the brace so they will be flush with the outside edges of the legs. Repeat with the other brace and pair of legs.
5. Begin the assembly of the stand by laying each pair of legs across its brace and base piece (A). Make sure the bottom edges of the legs and base are flush and that the base extends an equal distance to either side. Fasten the legs to the base and brace using water-resistant wood glue and 10d galvanized nails. If working with redwood, blunt the ends of the nails before using.
6. Set the two leg units upright and fit the shelves (D) between them. Make sure the outer edge of each lower shelf is flush with the ends of the base and that the upper shelf is centered over the braces. Fasten the shelves in place using water-resistant wood glue and 10d galvanized nails.
7. Blunt any penetrating nail ends and break over all sharp edges. Apply a water-resistant finish.

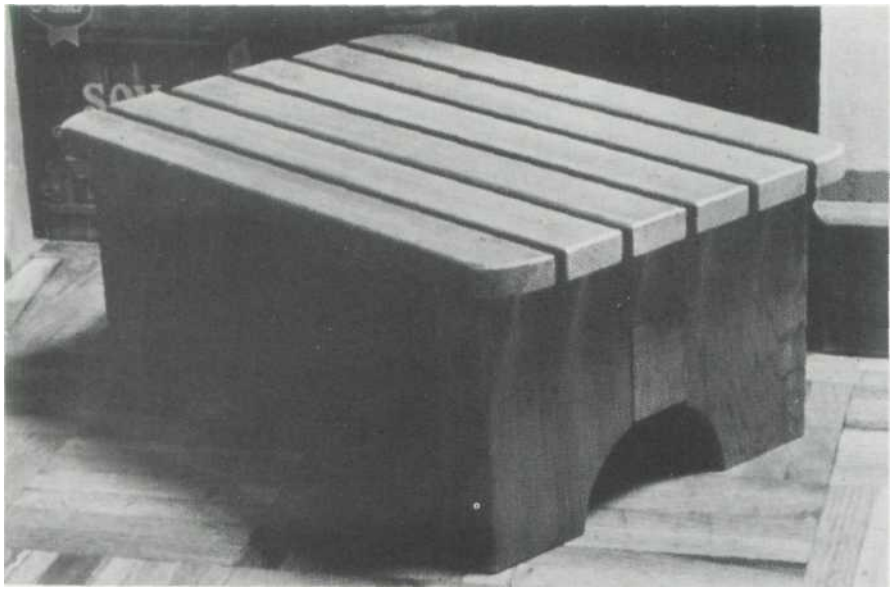


LIST OF MATERIALS

(finished dimensions in inches)

A	Base pieces (2)	1-1/2 × 3-1/2 × 22
B	Legs (4)	1-1/2 × 3-1/2 × 20
C	Braces (2)	1-1/2 × 3-1/2 × 7-1/2
D	Shelves (3)	3/4 × 7-1/4 × 30
	10d galvanized nails	
	Water-resistant wood glue	

GARDENING BENCH



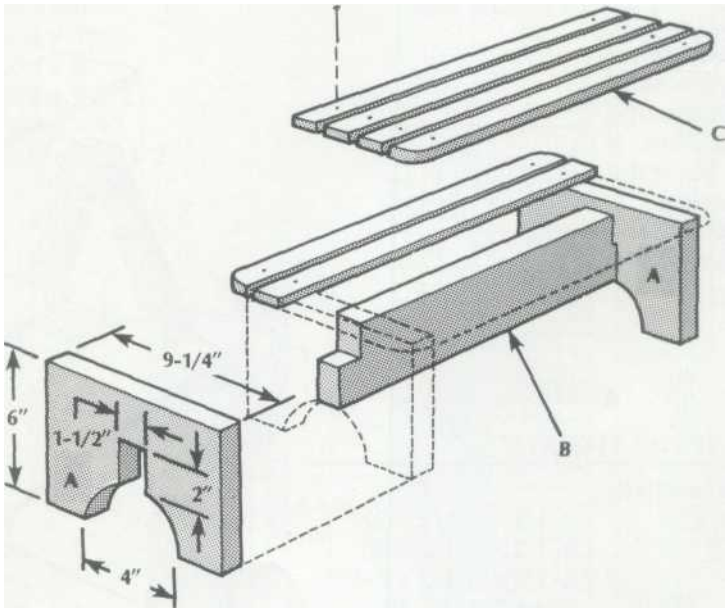
The functional design of this simple bench provides comfortable seating close to the ground, so you won't have to stoop or kneel. Besides being ideal for the garden or patio, it's also a natural in the bath or shower, if redwood or special-treated wood is used.

1. After cutting all of the pieces to size, round off the ends of the two outside top pieces (C).
2. Cut a 1-1/2" x 1-1/2" notch on each end of the cross brace (B) as shown to accommodate the legs (A).
3. Cut a 4"-diameter opening and 1-1/2" x 2" slot in the bottom of each leg as shown.
4. Glue and nail the legs to the cross brace. If working with red wood, blunt the ends of the nails before using.
5. Evenly space the top pieces on the legs,and secure them with glue and nails.
6. Sand and apply the water-resis tant finish of your choice.

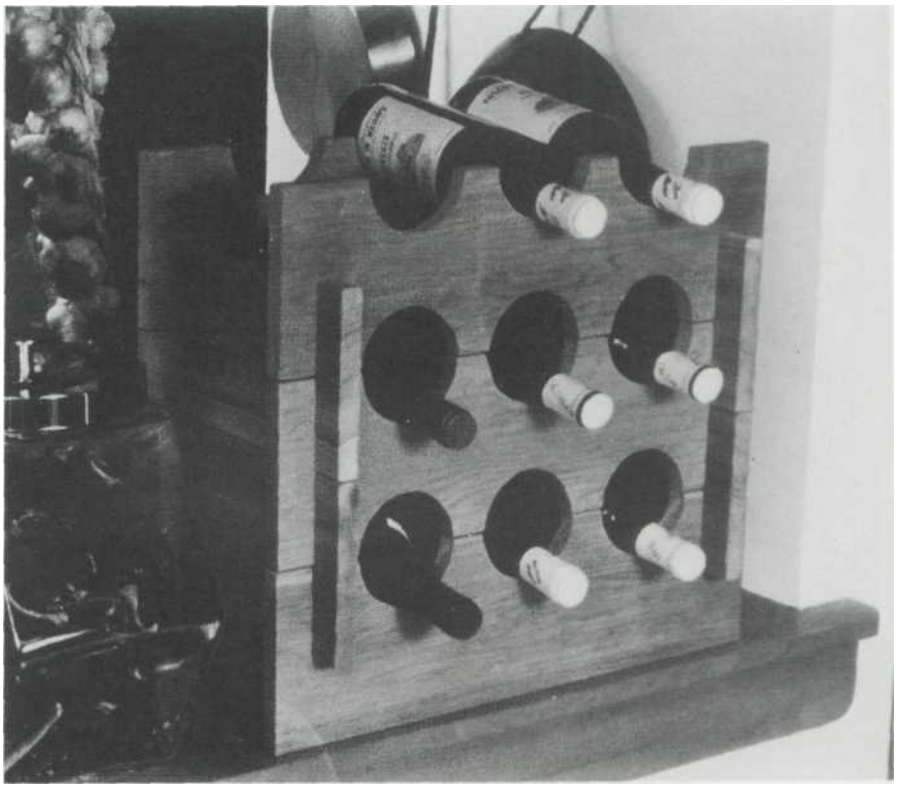
LIST OF MATERIALS

(finished dimensions in inches)

A	Legs (2)	1-1/2 × 9-1/4 × 6
B	Cross brace	1-1/2 × 3-1/2 × 12
C	Top (6)	3/4 × 1-1/2 × 15
	Galvanized nails	
	Wood glue	



WINE ~~BOTTLE RACK~~



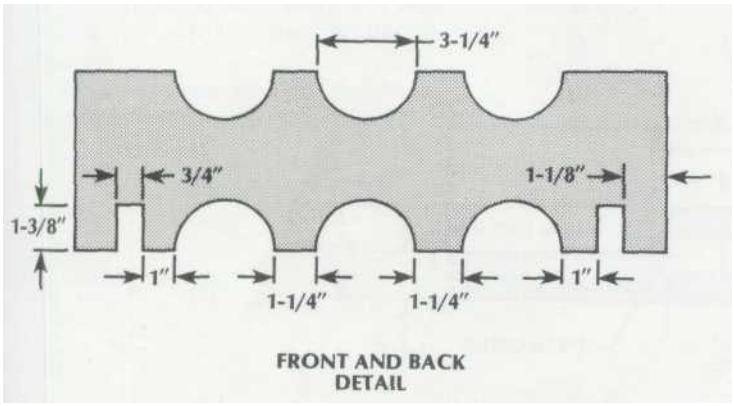
This wine bottle rack is expandable, so you can build the original three-tier module and add on later as your wine collection grows. Slotted construction enables it to go together quickly and be disassembled just as fast when it must be moved.

1. Make cardboard patterns of the front and back (A) and side pieces (B). Note that the front and back pieces have a 3/4" x 1-3/8" slot cut in each end, and three evenly spaced 3-1/4"-diameter cutouts as shown. The side pieces also have 3/4" x 1-3/8"slotscutintheirends.
2. Transfer the patterns to red wood (or any other wood of your choice), and cut as many pieces as needed for the number of tiers de sired. Clamp the side pieces to gether to assure a uniform fit, and cut the slots on a table saw or radial arm saw. Note that the bottom edges of the bottom tier pieces and the upper edges of the top tier pieces need no slots.
3. Use a saber saw to make the round cuts on the front and back pieces. No round cuts are needed on the bottom edges of the bottom tier pieces.
4. Assemble the rack by fitting the slots together as shown. No glue or nails are required.

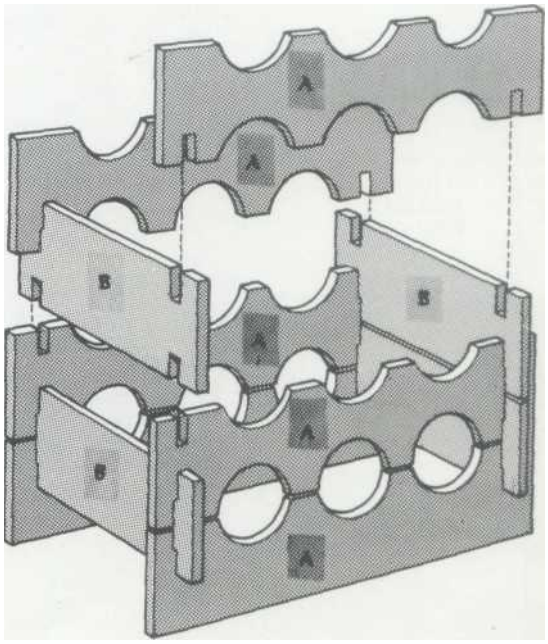
LIST OF MATERIALS

(finished dimensions in inches)

A	Front and back pieces (6)	3/4 × 5-1/2 × 18
B	Side pieces (4)	3/4 × 5-1/2 × 10-1/2



FRONT AND BACK DETAIL

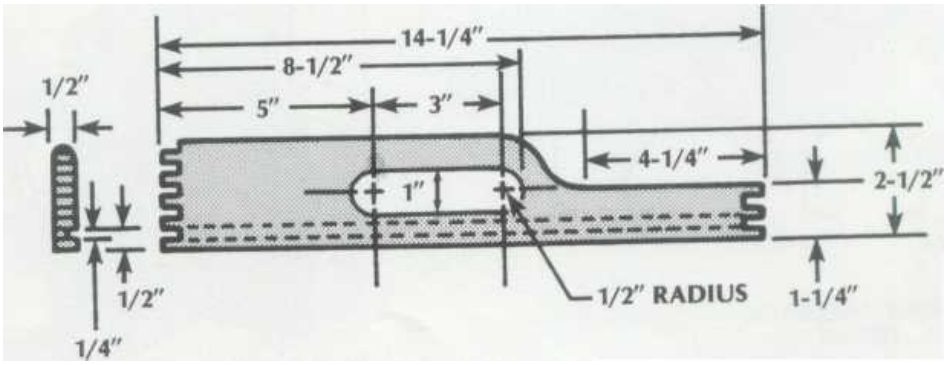


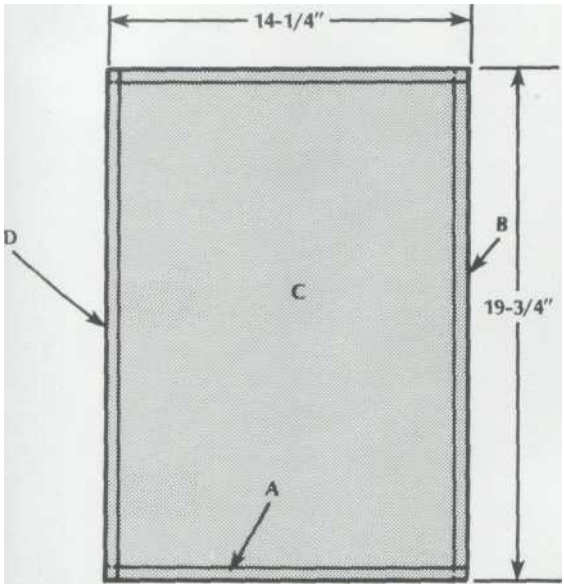
LAP TRAY COASTERS

F o r serving everything from snacks to meals, this handsome ap tray will be a welcome addition to your kitchen. And, to complement the tray, the easy-to-make coasters are perfect. Once the coaster project is properly set up, you can make numerous sets to give as gifts.

LAP TRAY

1. Cut the various parts to size us ing the dimensions given.
2. Make a template for the sides (A) using the pattern provided. Use a scroll saw, bandsaw, or jigsaw to cut out the sides, then cut out the handle holes.
3. Smooth the curved surfaces with a small drum sander.
4. Using a router with a 1/4" round ing over bit, shape the top edge of the sides and the handle holes. Shape the top edge of the front (B) and back (D) as well.
5. Using a 1/4" dado head set to a depth of 1/2", cut the fingers for the box joint corners on both ends of the sides, bottom, and back.
6. Reset the dado head to a depth of 7/32", then cut the 1/4"-wide grooves in the sides, front, and back to accept the bottom (C).
7. Assemble the tray using glue in the corner joints, but leaving the bottom free to respond to move ment of the other parts.
8. Sand the tray and finish as desired.

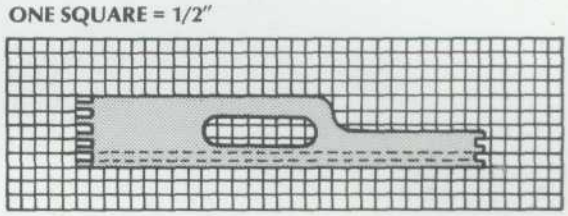




LIST OF MATERIALS (Lap Tray)

(finished dimensions in inches)

A	Sides (2)	1/2 × 2-1/2 × 14-1/4
B	Front	1/2 × 1-1/4 × 19-3/4
C	Bottom	1/4 × 13-5/8 × 19-1/8 plywood
D	Back	1/2 × 2-1/2 × 19-3/4
	Wood glue	



SIDE PATTERN

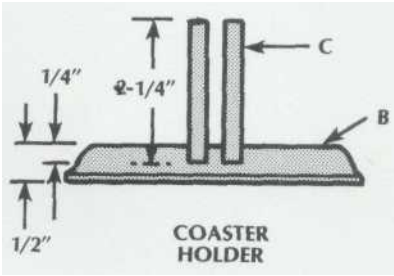
COASTERS

1. Cut the parts to size using the dimensions given, then sand smooth. Cut the coasters (A) so that the grain runs diagonally to all four edges.
2. Shape the edges of the base (B) usinga hand-held router equipped with a roman ogee bit.
3. Use a 1/4"-inch dado head set to a depth of 9/32" to cut the grooves in the coasters. Cut grooves 1/4" apart on one side of each piece, flip the piece over, rotate it 90°, and cut a second set of grooves.
4. Drill 1/4"-diameter holes 1/4" deep in the base to accommodate the dowels (C).
5. Glue the holders in place and check for squareness. Finish as desired.
6. Finish the coasters and holder as desired.

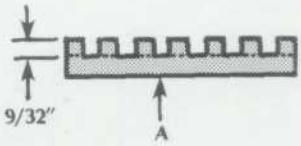
LIST OF MATERIALS (Coasters)

(finished dimensions in inches)

A	Coasters (4)	1/2 × 3-1/4 × 3-1/4
B	Base	1/2 × 4-1/4 × 4-1/4
C	Dowels (2)	1/4-dia. × 2-1/4
	Wood glue	



COASTER HOLDER



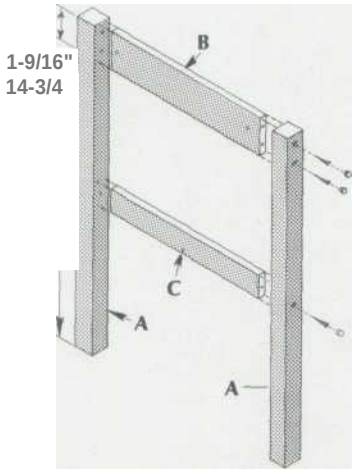
COASTER END VIEW

BUTCHER BLOCK
& Microwave Oven Stand

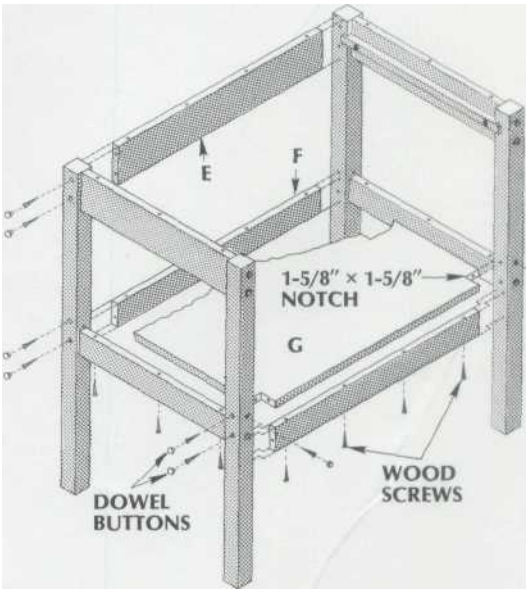
The butcher block has fallen out of favor in recent years, replaced by the countertop cutting board in an attempt to save space. This design, however, makes the butcher block a useful part of the kitchen once again. It has a drawer and shelves for storage, it can be moved to provide a cutting surface or extra counter space wherever needed, and it even has space for a microwave oven. In addition to the stand, plans are included for building a storage unit on the lower shelf in place of the oven.

MAKING THE STAND

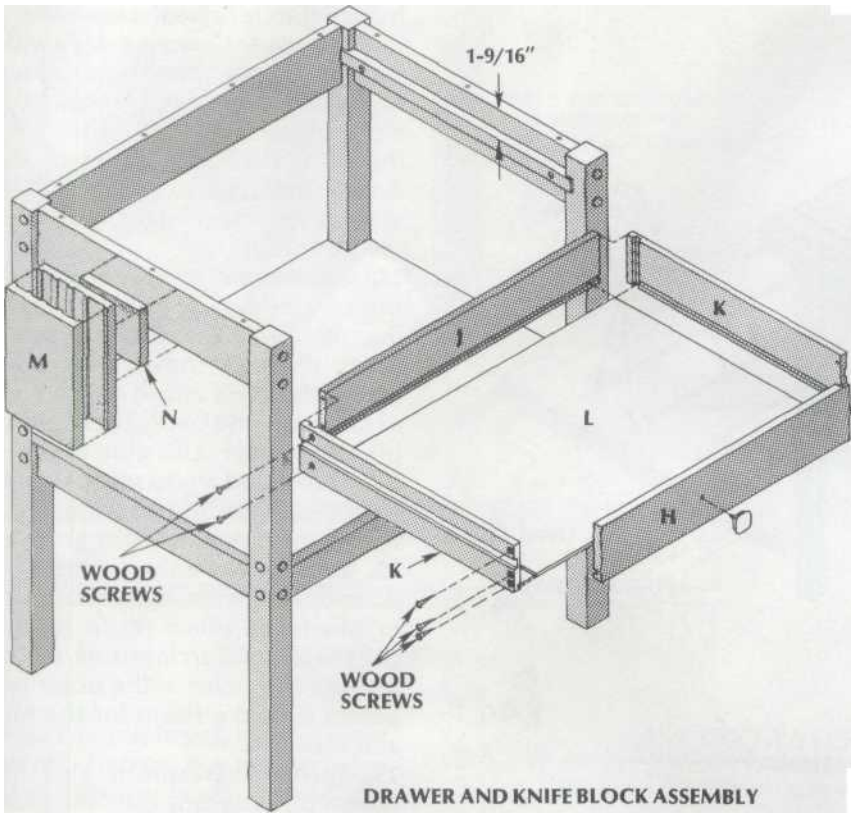
1. Cut all pieces to size according to the dimensions given.
2. If you want to make the stand mobile and add casters to the legs (A), cut 2" off the length of the legs and drill a center hole in the bot tom of each one to accept the cast er shaft.
3. Lay out the positions of the rail joints on the legs as indicated in the drawings. Note that all rails are centered on the width of the legs and that the tops of the upper rails (B, E) and legs are flush. The lower rails (C, F) should be set 14-3/4"



LEG AND RAIL ASSEMBLY



BASE ASSEMBLY



DRAWER AND KNIFE BLOCK ASSEMBLY

above the bottoms of the legs, unless the shelf (G) will house a microwave oven. In that case, drop the lower rails 4".

4. Drill, countersink, and counterbore pilot holes for a pair of #8 wood screws at each joint between rails and legs. Drill through the legs into the ends of the rails and make the counterbores 3/8" in diameter and 3/4" deep.

5. Drill another set of counterbored pilot holes for #8 screws through each of the lower rails—three holes in each end rail and four in each front and back rail. Run the holes through the width of the rails, from the lower to the upper edges, and make the counterbores 1-3/8" deep. It might help to drill the counterbores first, then use a long, thin bit to complete the pilot holes.

6. Cut 3/8"-wide x 1/2"-deep rabbets across the rear ends and 1" x 1/2" rabbets across the front ends of the drawer guides (D). Also, cut 1-5/8" x 1-5/8" notches on each corner of the shelf for fitting it between the legs.

7. Fasten the legs and rails together using wood glue and #8 x 1-3/4" wood screws. Then fasten the shelf in place, running #8 x 1-3/4" screws through the rails into its underside.

8. Position the drawer guides against the inside faces and 1-9/16" below the upper edges of the upper end rails. Fasten the guides to the rails using wood glue and #6 x 1-1/4" wood screws. Countersink the screws so their heads will not interfere with the operation of the drawers.

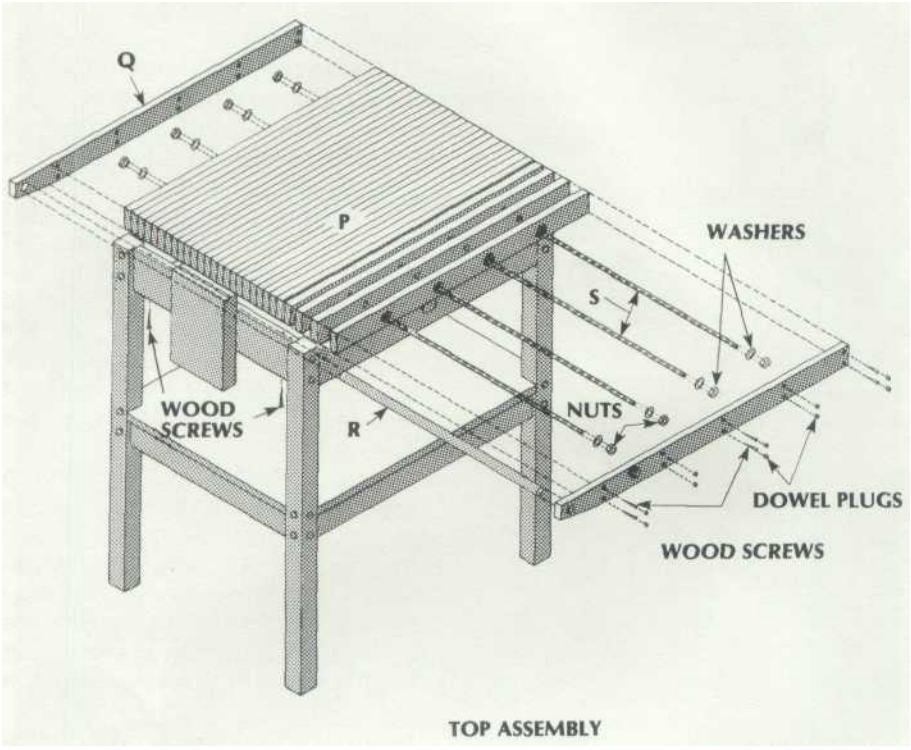
9. Cut a 3/4"-wide x 1/4"-deep groove 1" below the upper edge along the outside face of each drawer side (K). Check the fit between these grooves and the drawer guides. If necessary, widen the grooves to allow the drawer sides to slide smoothly back and forth on the guides.

10. Cut 1/2"-wide x 1/2"-deep rabbets across the ends of the drawer

LIST OF MATERIALS (Stand)

(finished dimensions in inches)

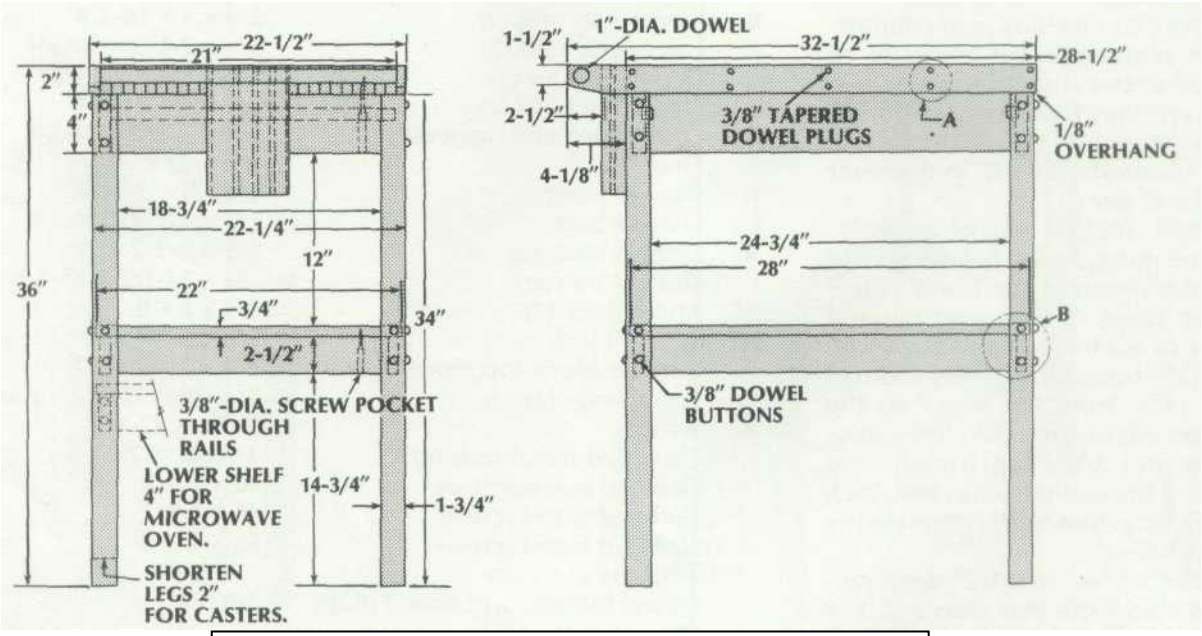
A	Legs (4)	1-3/4 × 1-3/4 × 34
B	Upper end rails (2)	3/4 × 4 × 18-3/4
C	Lower end rails (2)	3/4 × 2-1/2 × 18-3/4
D	Drawer guides (2)	3/4 × 3/4 × 20-1/8
E	Upper back rail (2)	3/4 × 4 × 24-3/4
F	Lower back and front rails (2)	3/4 × 2-1/2 × 24-3/4
G	Shelf	3/4 × 22 × 28
H	Drawer front	3/4 × 4 × 24-5/8
J	Drawer back	1/2 × 3-1/2 × 24-1/8
K	Drawer sides (2)	1/2 × 3-1/2 × 18
L	Drawer bottom	1/4 × 17-1/2 × 24-1/8 plywood
M	Knife block (2)	3/4 × 6 × 9
N	Spacer block	5/8 × 5 × 4
P	Butcher block top pieces (28)	3/4 × 2 × 28-1/2
Q	Top facings (2)	3/4 × 2 × 32-1/2
R	Handle	1 dia. × 22-1/2
	Threaded metal rods (4)	3/8 dia. × 20-7/8
	Flathead wood screws	#6 × 1-1/4
	Flathead wood screws	#8 × 1-1/2
	Flathead wood screws	#8 × 1-3/4
	Washers and nuts	
	Dowel buttons and dowel plugs	3/8 dia.
	Drawer pull	
	Wood glue	



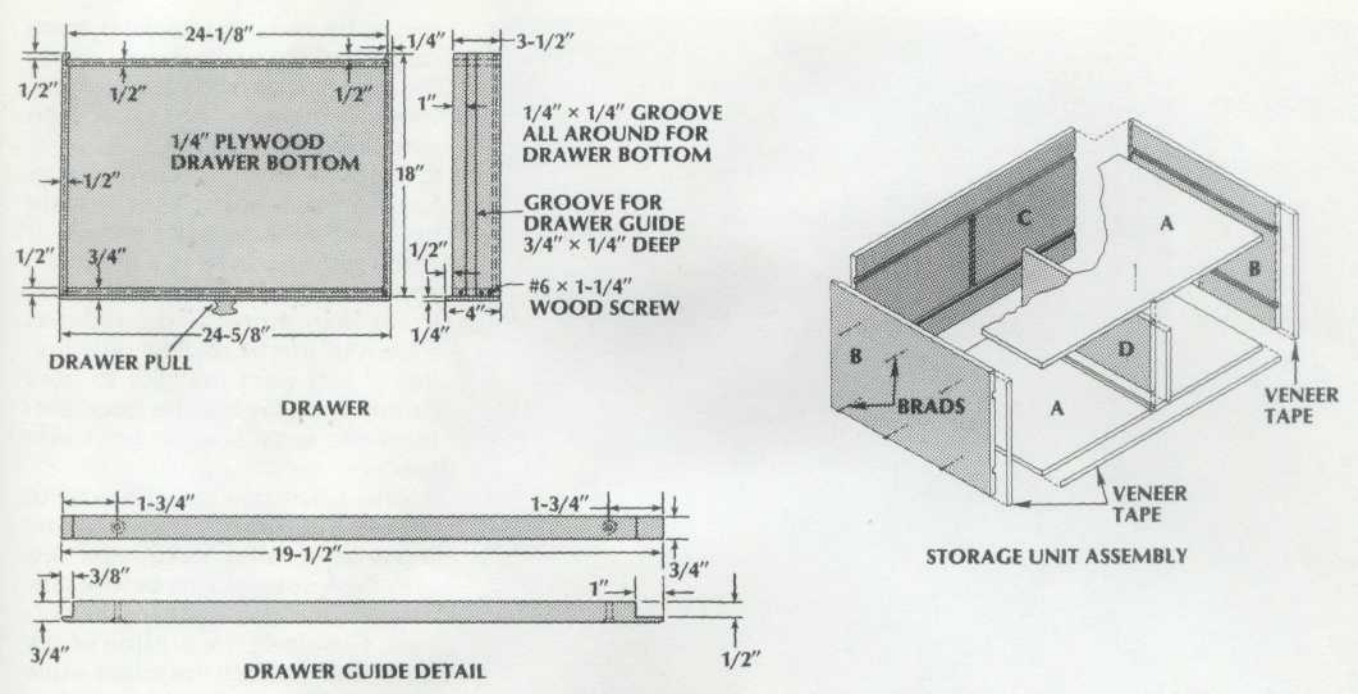
TOP ASSEMBLY

front (H) to receive the ends of the sides. Cut 1/4"-deep x 1/2"-wide dadoes across the drawer sides, 1/2" in from the rear, to receive the ends of the back (J). Cut 1/4"-deep x 1/4"-wide grooves in the drawer front, back, and sides, 1/4" above their lower edges, to receive the bottom (L).

11. Center and drill a screw hole through the drawer front for attaching the pull. Countersink screw holes through the drawer sides where they will attach to the ends of the front and back. Then assemble the drawer. Use glue and #6 x 1-1/4" flathead wood screws to join the sides, front, and back, but leave the bottom unglued in the grooves.
12. Drill four evenly spaced 3/8"-diameter holes through each butcher block top piece (P) to receive the metal reinforcing rods. Counterbore the holes in the outer two pieces to make room for the nuts and washers.
13. Spread waterproof glue between all adjacent butcher block top pieces. Thread the rods through



BUTCHER BLOCK MICROWAVE STAND LAYOUT



the pieces and install the nuts and washers. Tighten the nuts to align and clamp the pieces while the glue dries.

14. Trim one end of each facing (Q) to the profile shown in the stand layout drawing and drill holes for the ends of the handle (R). Begin the tapers 3" from the ends and center the holes 1-1/4" from the ends of the facing pieces.

15. Fasten the facings to the top using waterproof glue and #8 x 1-1/2" flathead wood screws, making their right ends and upper edges flush. Glue the handle in place at the same time. Position the screw holes where you will not hit the metal rods. Counterbore the holes and fill them with 3/8"-diameter plugs.

16. Sand the top and facings flush, then finish them with mineral oil or a similar non toxic finish. Sand the
rest of the stand, fill the counterbored holes with wood buttons, then apply polyurethane or another finish of choice.

17. Center the top on the frame and mark the position of the screw holes in the upper edges of the rails. Drill pilot holes into the underside of the block top, then fasten it to the rails using #8 x 1-3/4" flathead wood screws. 18. Cut matching 1/16"-deep grooves in the two halves of the knife block (M). Then glue the pieces together, aligning the grooves. Nail or screw the 5/8"-thick spacer block (N) to the left end rail, then glue the knife block to the spacer, making its top flush with the upper surface of the butcher block.

LIST OF MATERIALS (Storage Unit)

(finished dimensions in inches)

A	Top and bottom (2)	1/2 × 16-3/4 × 24 plywood
B	Sides (2)	1/2 × 11-1/2 × 17 plywood
C	Back	1/2 × 11-1/2 × 24 plywood
D	Divider	1/2 × 7 × 16-3/4 plywood
	Wire brads	#17 × 1
	Veneer tape	
	Wood filler	
	Wood glue	

MAKING THE STORAGE UNIT

1. Cut all pieces to size from 1/2"-thick veneer plywood.

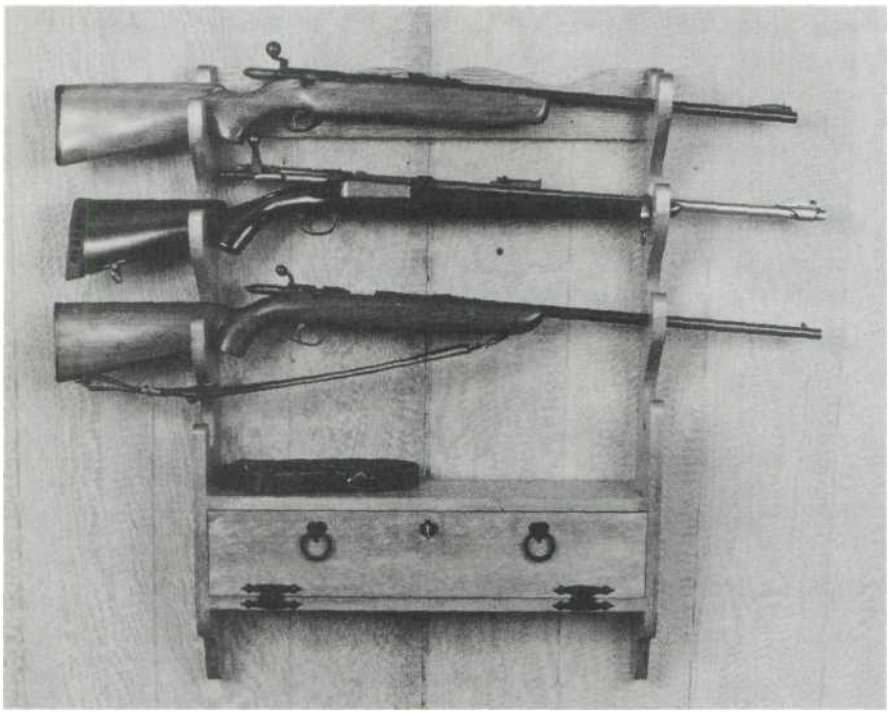
2. Cut 1/2"-wide x 1/4"-deep rabbets across the rear ends of the sides (B) and 1/2" x 1/4" grooves, spaced 6-1/2" apart, along the length of the sides and back (C). Also, cut 1/2" x 1/4" dadoes across the center of the top and bottom (A) and back. The dado on the back should only connect the two grooves.

3. Assemble the unit with glue and #17 x 1" wire brads. Set the brads and fill with a wood filler that matches the finish you will be using.

4. Cover all exposed edges of the plywood with veneer tape.

5. Finish the drawer to match the stand and storage unit, then install.

SPORTSmans RACK



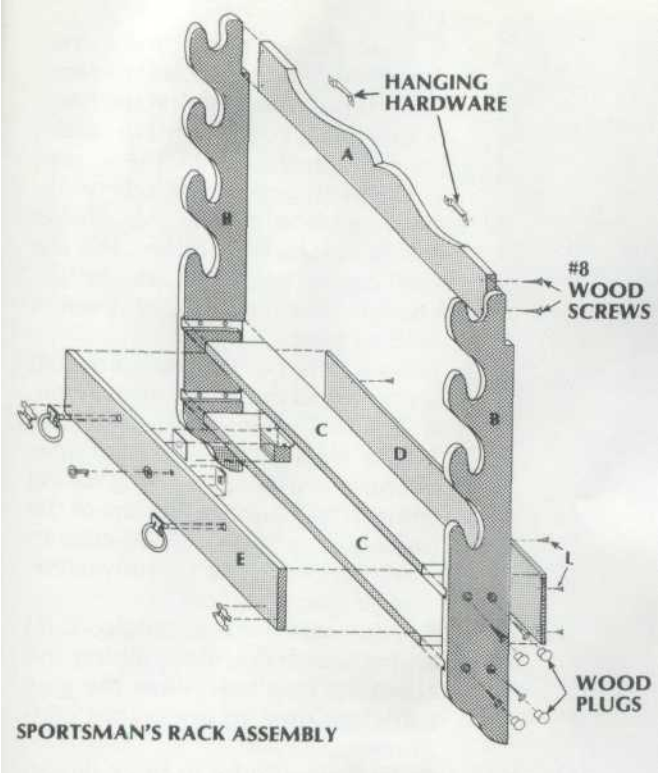
Here's the ideal method of storing those prized rifles and fishing rods—the sportsman's rack. Not only does it make an eye-catching display, but it also has a locking compartment for storing shells, lures, and other items.

1. Select two 8' lengths of good quality 1 x 6 lumber, hardwood or softwood. Cut the top (A), sides (B), shelves (C), and door (E) to length, then rip them to width. Rip the pieces 1/16" wide at first, then use a jointer or hand plane to clean up the ripped edges.
2. Cut a pair of 1/2"-wide x 1/4"-deep dadoes across the inner face of each side piece to receive the ends of the shelves. Space the dadoes 5" apart and set the lower one 5-1/2" above the bottom end of each board, as shown in the front view drawing.
3. Cut a 1/4"-wide x 1/4"-deep rabbet along the back edge of each side piece in the area between the dadoes to make room for the ends of the plywood back panel.
4. Cut 1/4"-wide x 1/4"-deep rabbets along what will become the inside rear edges of the shelves to accept the upper and lower edges of the back panel.
5. Cut a 4"-long notch 3/4" deep into the rear edge at the upper end of each side piece to make room for the ends of the rack's top rail (A).
6. Dry assemble the pieces to make sure everything fits correctly. Fine tune the joinery as needed.
7. Begin the layout of the curved shapes on the top rail and side pieces by making templates from cardboard or heavy paper using the patterns provided as guides. Then use the templates to trace the patterns onto the boards.
8. Before laying out the hook patterns on the side pieces, decide how you want to use the rack. If you want it to serve as a gun rack, set the hooks on the left side 1 -1/2" lower than those on the right, as shown in the front view drawing. But, if you want the rack to hold fishing gear, lay out the hook patterns the same way on both side pieces.
9. Use a bandsaw or saber saw to cut out the patterns traced on the top rail and sides. Make relief cuts into the hook pockets before cutting around the tight inside corners. Cut along the outside of the lines, then smooth the edges while sanding down to the lines.
10. Center the latch plate part of the lock next to the front edge on the underside of the top shelf. Mark around it, then chisel out the shelf as needed for mounting the plate.
11. Clamp the top rail, sides, and shelves together while drilling pilot holes for #8 wood screws. Drill 3/8"-diameter x 1/4"-deep counterbore holes over the pilot holes in the sides and countersink the holes that run through the back of the top rail.

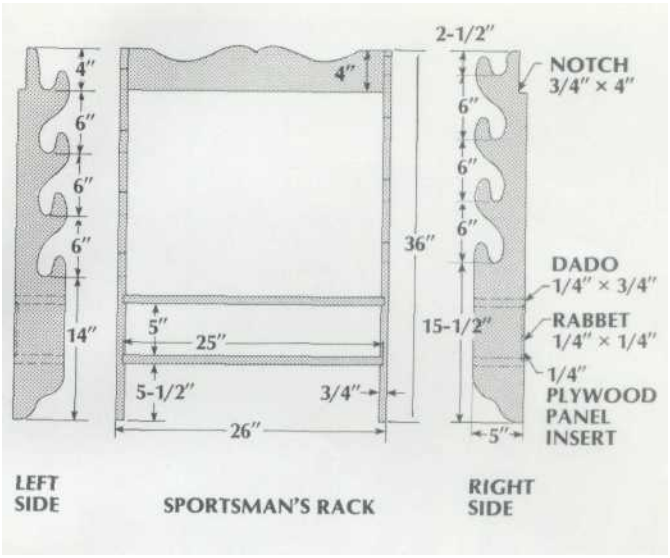
LIST OF MATERIALS

(finished dimensions in inches)

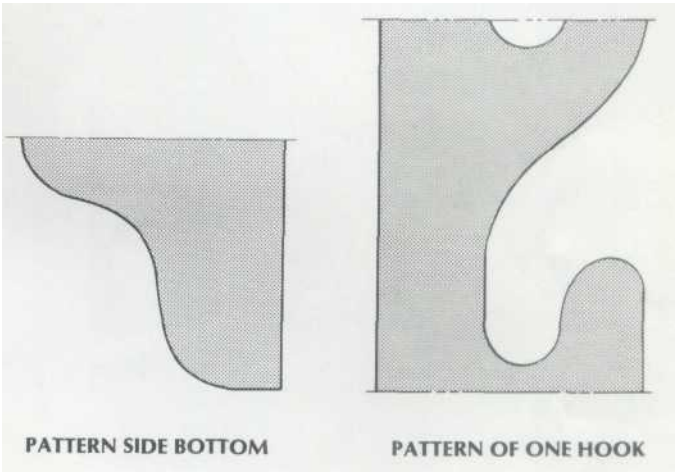
A	Top	3/4 × 4 × 26
B	Sides (2)	3/4 × 5 × 36
C	Shelves (2)	3/4 × 5 × 25
D	Back	1/4 × 5-1/2 × 25
E	Door	3/4 × 4-15/16 × 24-7/16
	Dowel buttons or plugs	3/8 dia. × 1/4
	Flathead wood screws	#8 × 1-1/4
	Wire nails	
	Hinges with screws (2 sets)	
	Magnetic catch and plate	
	Lock and key	
	Door pulls	
	Hanging hardware	
	Wood glue	

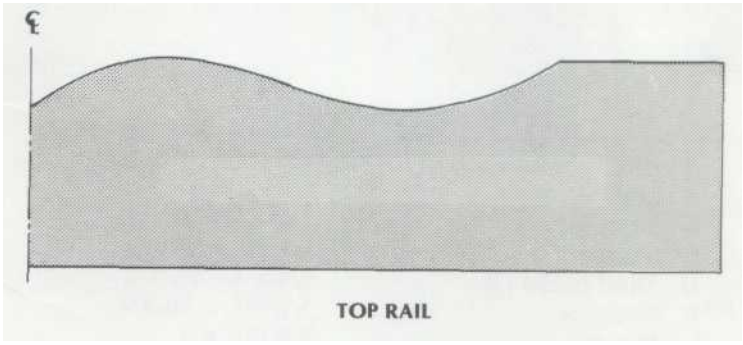


SPORTSMAN'S RACK ASSEMBLY



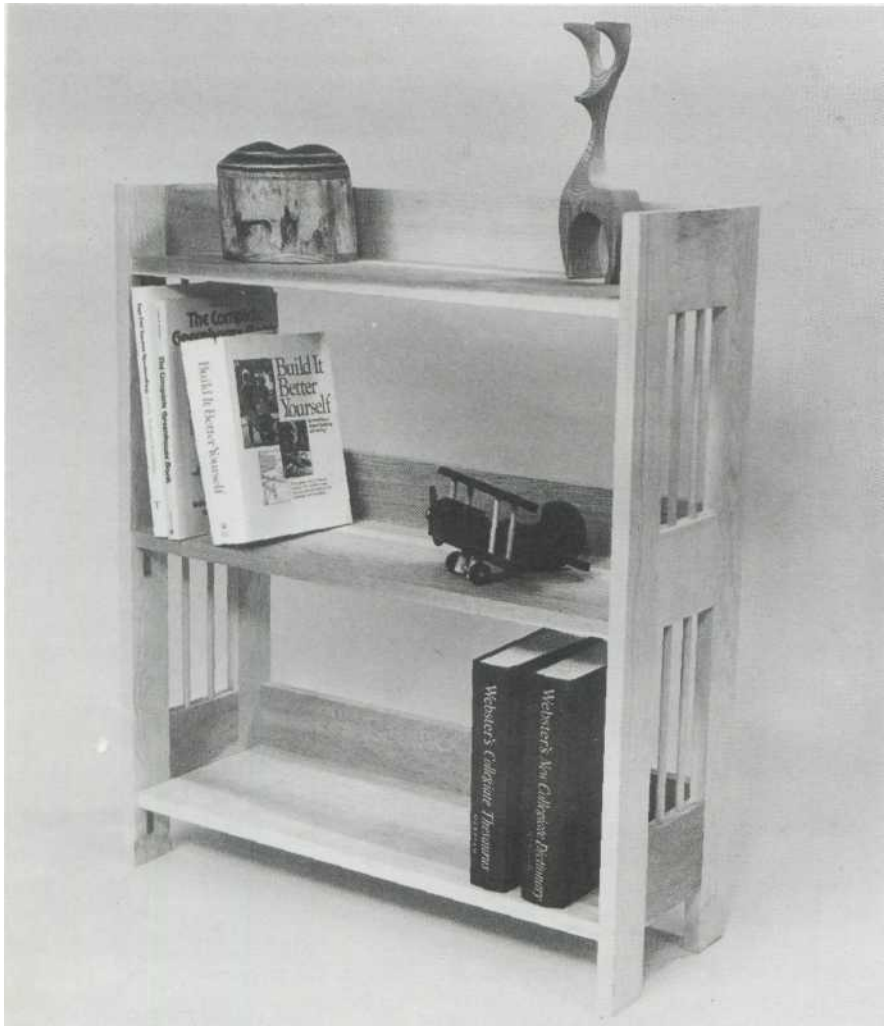
LEFT SIDE SPORTSMAN'S RACK RIGHT SIDE





12. Disassemble the rack and sand all the parts. Lightly round over all sharp edges that will be exposed after assembly. Then, reassemble the shelves, sides, and top rail us ing wood glue and #8 x 1-1/4" flat-head wood screws.
13. Cut a piece of 1/4" plywood to size for the back (D). Fasten the back to the shelves and sides using glue and wire nails.
14. Glue 3/8"-diameter wood plugs in the counterbored screw holes. After the glue dries, sand the plugs flush with the sides.
15. Temporarily mount the hinges on the door, then fit the door in place and fasten the hinges to the bottom shelf. Check to see that the door operates properly, then mark the location for the lock keyhole.
16. Remove the hinges from the door and shelf. Drill the keyhole in the door, as well as holes for the door pulls.
17. Sand the door, breaking all sharp edges. Apply the desired finish to the door and the rest of the rack. After the finish has dried, mount all the hardware on the door and rack, including your choice of hardware for hanging the rack on the wall.

Chairside Bookcase



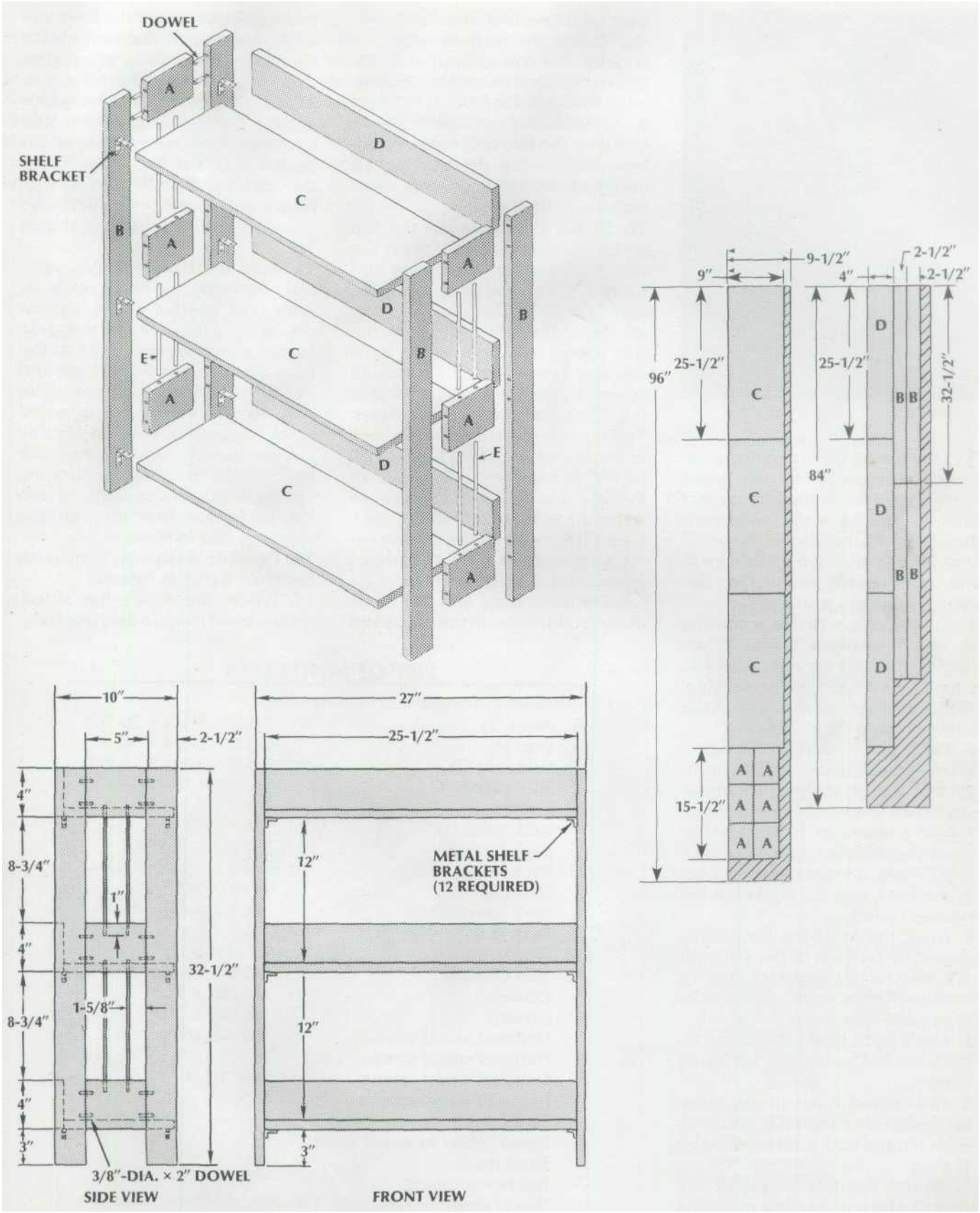
LIST OF MATERIALS

(finished dimensions in inches)

A	End rails (6)	3/4 × 4 × 5
B	Stiles (4)	3/4 × 2-1/2 × 32-1/2
C	Shelves (3)	3/4 × 9 × 25-1/2
D	Shelf backs (3)	3/4 × 4 × 25-1/2
E	Rods (8)	3/8 dia. × 10-3/4
	Dowels	3/8 dia. × 2
	Metal shelf brackets (12)	3/8 × 1-1/2 × 1-1/2
	6d finishing nails	
	Wood glue	

How many times have you stretched out on your favorite easy chair, only to realize that the book or magazine you wanted to read is on the other side of the room? With this attractive chairside bookcase, reading material is always within reach. In addition, the top shelf can be used to display knick-knacks, small plants, or even a reading lamp.

1. To begin, cut the pieces to size according to the dimensions given.
2. Drill 3/8"-diameter dowel holes 1-1/16" deep in the ends and sides of the end rails (A). Using dowel centers, transfer the centers of the holes to the stiles (B). Be sure to mark the centers accurately to en sure proper assembly.
3. Assemble the end rails, rods (E) and rails with dowels by gluing and clamping in place. Allow the glue sufficient time to dry before con tinuing.
4. Drill pilot holes in the rails and shelves (C) for the bracket screws, and attach the brackets to the stiles.
5. Attach the shelf backs (D) to the stiles with 6d finishing nails.
6. To complete the assembly, at tach the shelves to the brackets with screws.
7. Sand with 150-grit paper, fol lowed by 180-grit. Finish as desired.



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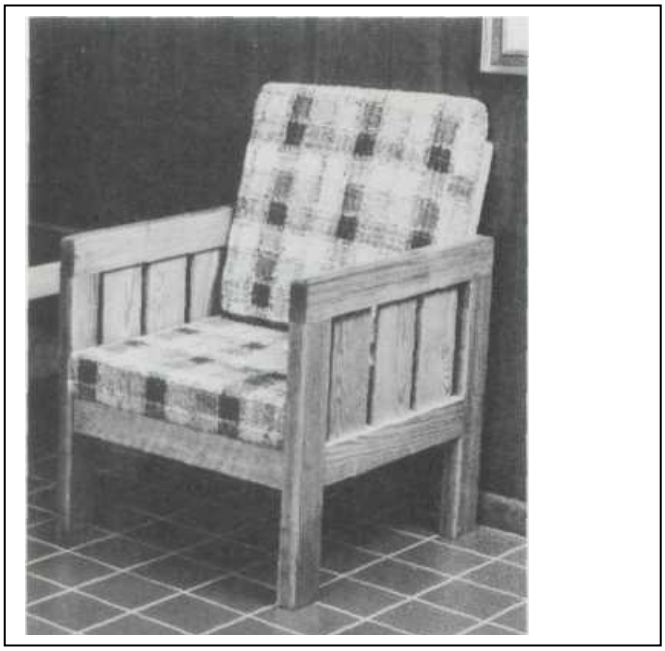
Armchair



It's becoming more and more expensive these days to own good handcrafted furniture. This project enables you to make your own armchair at a fraction of the retail cost. What's more, you'll be sure of the craftsmanship and quality, because you made it yourself.

1. Cut the pieces to size according to the dimensions given. When ripping the back cleat (L) to width, cut a 16° bevel on the ripped edge. Also, cut tapers on the ends of the back supports (K) as shown.
2. Drill 1-3/8"-deep x i"-wide x 2-1/4"-long mortises in the arms (A) and legs (B) as shown. Remove any excess stock with a hand chisel.
3. Use a router or hand chisel to make the 1/2"-deep x 3/8"-wide x 2-1/2"-long mortises in the edges of the back rails (G, H). Leave the corners round.
4. Mark the locations for cutting tenons in the ends of the side rails (C), front rail (E), and back rails. To mark, score the wood with a knife to prevent splintering.
5. Use a dado blade to cut the 1"-thick x 2-1/4"-wide x 1-1/4"-long tenons.
6. Drill dowel holes in the arms, side rails, side panels (D), and back stiles (F), and rails. Drill these holes 1" deep.
7. Round the side edges of the slats (J) with a router and rounding over bit. This will enable them to fit the mortises in the back rails.
8. Sand all pieces smooth with 150-grit paper. Dry-assemble the arm chair to check for fit.
9. Assemble the side frames. Begin by fitting the side rails between the legs, then install the side panels and the arms. Use glue in all joints and clamp until dry.
10. Fit the slats between the top and bottom back rails. Fasten the rails to the stiles using glue and dowels. Clamp and set aside for the glue to dry.
11. Assemble the front rail and the side frames using glue in the mor tise and tenon joints. Clamp the assembly, then immediately install the front (M) and side (N) cleats. Butt the side cleats against the back of the front rail and set them 1/16" to 1/8" below the upper edges of the side rails. Drill pilot holes counterbored at least 1/4" deep, then fasten the cleats to the frames us ing glue and #10 x 2-1/4" flathead wood screws. If you prefer, dry as semble the frames and rail while drilling pilot holes in the cleats and frames, then remove the front rail while you install the side cleats. Glue the front rail in place after that.
12. Fit the back cleat in place against the tail ends of the side cleats, making their upper edges flush. Fasten the back cleat to the side cleats using #10 x 2-1/4" flathead wood screws set in pilot holes counterbored to a depth of at least 1/2".
13. Hold the back frame in posi tion between the sides with its lower rail pressed firmly against the back cleat. Mark the side frames along the rear edge of the back. Remove the back frame and install the back supports using glue and #8x1-1/4" flathead wood screws, countersunk or slightly counterbored. Then fasten the back frame in place by running screws through its bottom rail into the back cleat and through the supports into its stiles.
14. Doallfinalsanding,thenfinish the chair frame as desired.
15. When the finish has dried, mount band irons to the cleats with

LIST OF MATERIALS

(finished dimensions in inches)

A	Arms (2)	1-1/2 × 3-1/4 × 26-1/2
B	Legs (4)	1-1/2 × 3-1/4 × 24
C	Side rails (2)	1-1/2 × 3-1/4 × 22-1/2
D	Side panels (6)	1/2 × 5 × 10-1/4
E	Front rail	1-1/2 × 3-1/4 × 24
F	Back stiles (2)	3/4 × 3 × 24
G	Back top rail	3/4 × 3 × 15-1/2
H	Back bottom rail	3/4 × 3 × 15-1/2
J	Slats (3)	3/8 × 2-1/2 × 19
K	Back supports (2)	3/4 × 3/4 × 8
L	Back cleat	1-1/4 × 2 × 21-1/2
M	Front cleat	1-1/4 × 1-1/2 × 19
N	Side cleats (2)	1-1/4 × 1-1/2 × 17-1/2
	Dowels	1/4 dia. × 2
	Dowels	3/8 dia. × 2
	Flathead wood screws	#10 × 2-1/4
	Flathead wood screws	#8 × 1-3/4
	Flathead wood screws	#8 × 1-1/4
	Panhead wood screws	#6 × 3/4
	Tacks	
	Dowel plugs or wood putty	
	Band irons	
	Rubber webbing	
	Wood glue	

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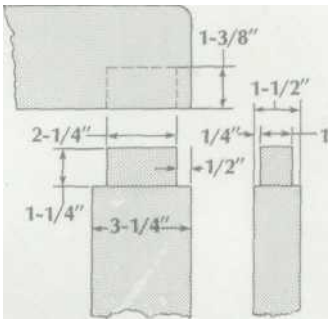
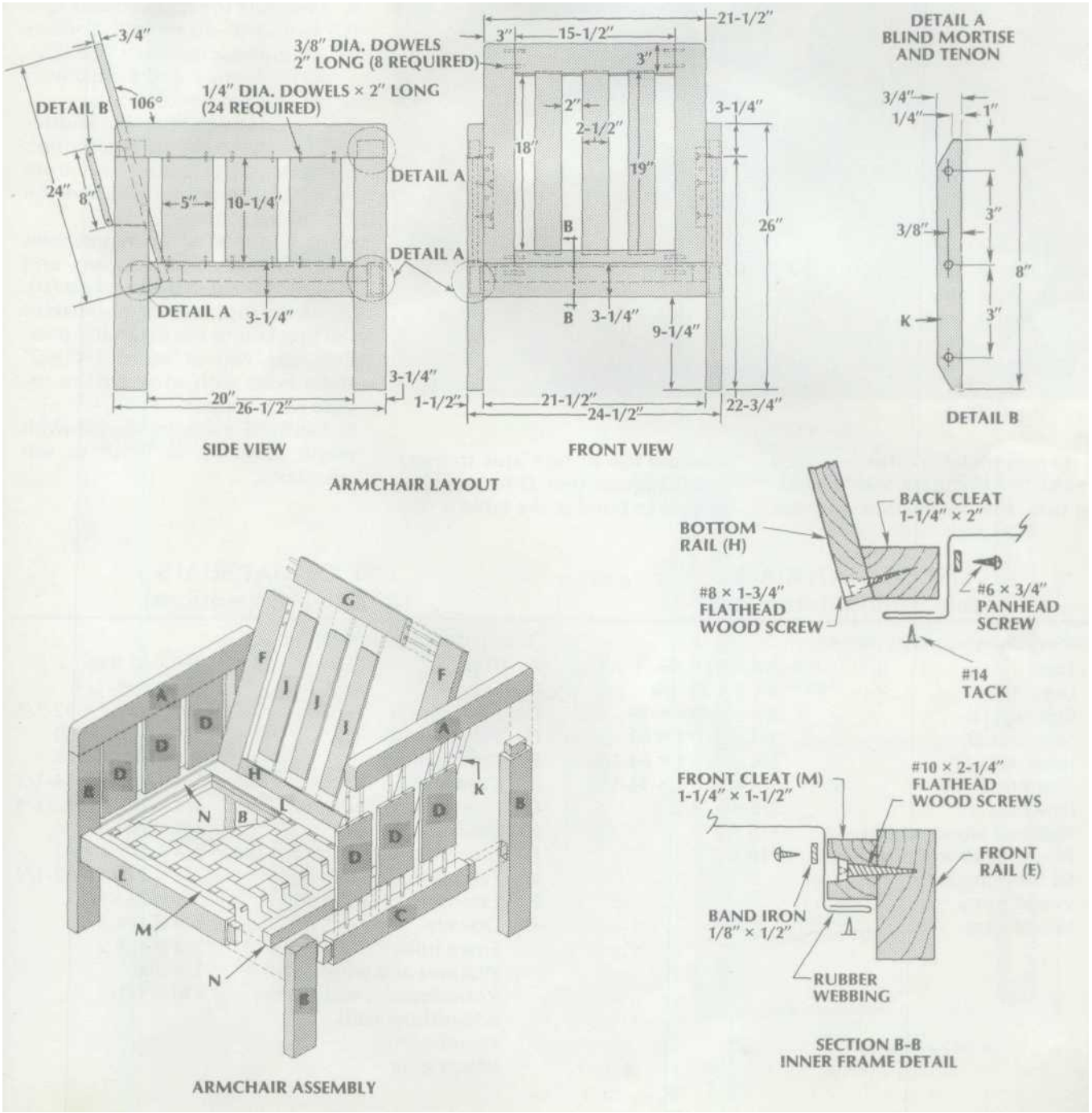
#6 x 3/4" panhead screws. Do not screw the irons tight against the cleats; leave a 1/16" gap to pull the rubber webbing through. 16. Mark the proper spacing of the rubber webbing strips. Starting on one side, pull one strip through, double the end over, and tack fast. Repeat for each strip.

17. Stretch the strips across to the other side, and feed the end be tween the iron and cleat. Pull tight, then double the ends over and tack. Repeat this procedure for stretching the strips from front to back. Remember to interweave the webbing as shown.

18. Buy or make cushions to fit the armchair.





Parsons Table

This parsons table offers a surface area of 19-1/4 square feet. By adding two table extensions, you can ncrease the surface area to more than 32 square feet. Either way you choose to build it, the table is sure to be a welcome addition to your dining room or kitchen.

1. Cut all pieces to size according to the dimensions given.
2. Drill 3/8"-diameter dowel holes in the legs, side rails (D) and end rails (C), as shown.
3. Construct the frame (C,E,F) us ing 6d finishing nails, then nail and glue the top (A) in place. Be sure to fill all nail holes with wood putty.
4. Assemble the legs and side rails (D) with 3/8"-diameter x 2" dow els, glue, and screws (see Detail A).

NOTE: Steps 5 and 6 deal with tables that have extensions.

5. The extension table has shorter end rails (C) to allow the extension supports (G) to extend out from the ends. The supports receive the extensions as shown.
6. Drill four 9/16"-diameter holes in each extension support and matching holes in the brackets (H). When the supports are mounted to the brackets in the extended posi tion, use two or more 1/4" x 2" stove bolts with wing nuts to se cure each support.
7. Sand all surfaces. Cover with plastic laminate or finish to suit your taste.

LIST OF MATERIALS (Table without Extensions)

(finished dimensions in inches)

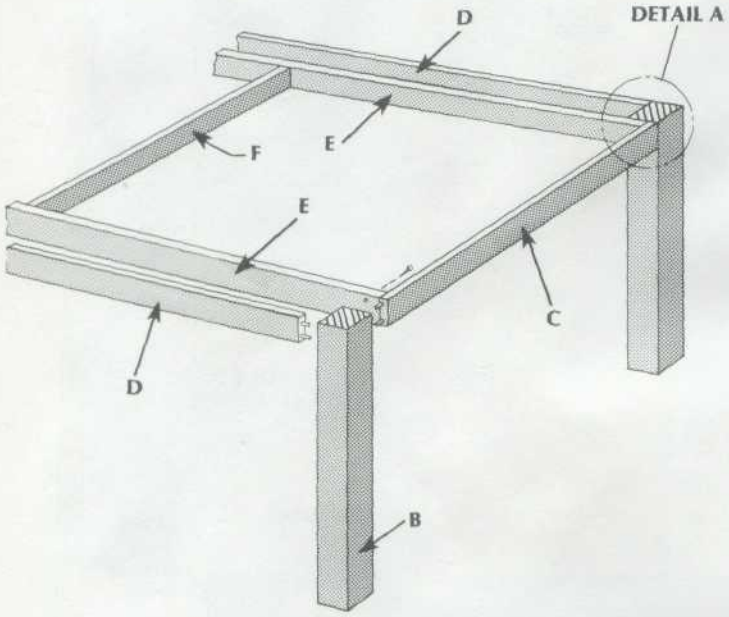
A	Top	3/4 × 42 × 66
B	Legs (4)	3 × 3 × 28-1/4
C	End rails (2)	3/4 × 2-1/4 × 36
D	Side rails (2)	3/4 × 2-1/4 × 60
E	Inner rails (2)	3/4 × 2-1/4 × 64-1/2
F	Center rail	3/4 × 2-1/4 × 34-1/2
	Dowels	3/8 dia. × 2
	Flathead wood screws	#10 × 2
	Roundhead wood screws	#10 × 2
	6d finishing nails	
	Wood putty	
	Wood glue	

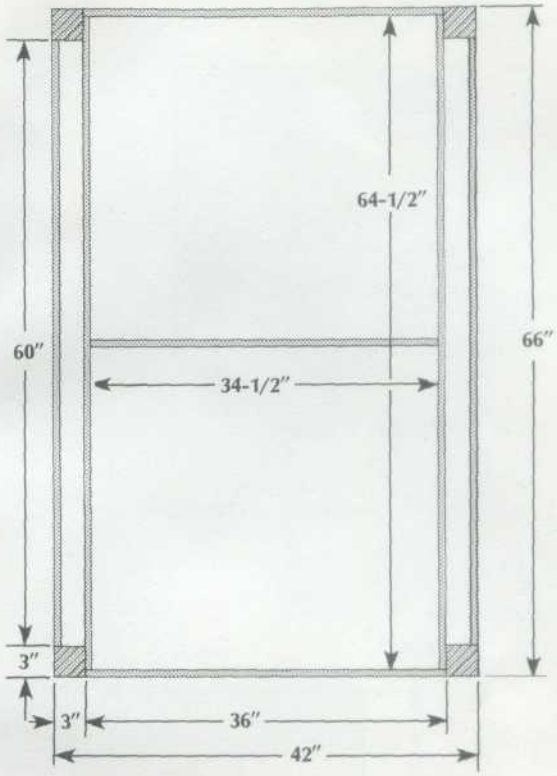
LIST OF MATERIALS (Table with Extensions)

(finished dimensions in inches)

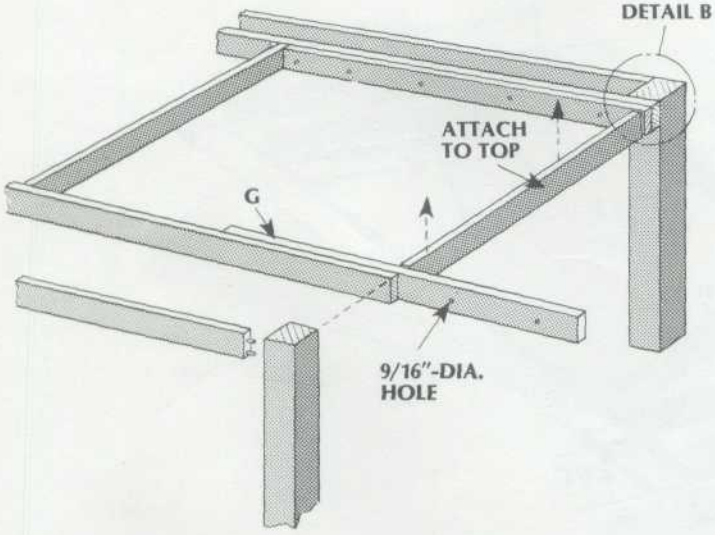
A	Top	3/4 × 42 × 66
B	Legs (4)	3 × 3 × 28-1/4
C	End rails (2)	3/4 × 2-1/4 × 32-7/8
D	Side rails (2)	3/4 × 2-1/4 × 60
E	Inner rails (2)	3/4 × 2-1/4 × 66
F	Center rail	3/4 × 2-1/4 × 34-1/2
G	Extension supports (4)	3/4 × 2-1/4 × 32-3/4
H	Brackets (8)	3/4 × 2 × 16
J	Extension side rails (2)	3/4 × 2-1/4 × 42
K	Extension end rails (4)	3/4 × 2-1/4 × 22-1/4
L	Extension tops (2)	3/4 × 23 × 42
	Dowels	3/8 dia. × 2
	Stove bolts	1/4 dia. × 2
	Washers and wing nuts	1/4 dia.
	Roundhead wood screws	#10 × 1-1/2
	6d finishing nails	
	Wood putty	
	Wood glue	

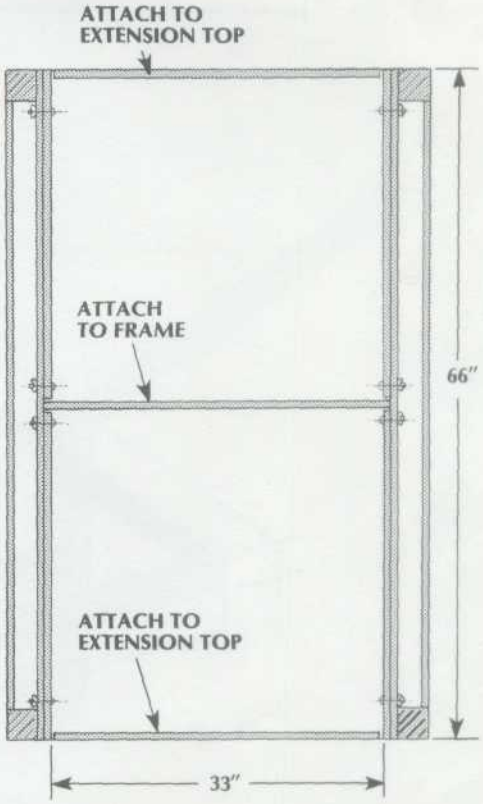
FRAME ASSEMBLY DIAGRAM
(WITHOUT EXTENSION)





FRAME ASSEMBLY DIAGRAM
(WITH EXTENSION)





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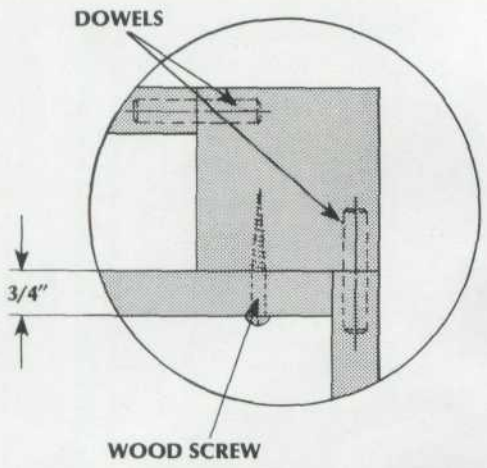
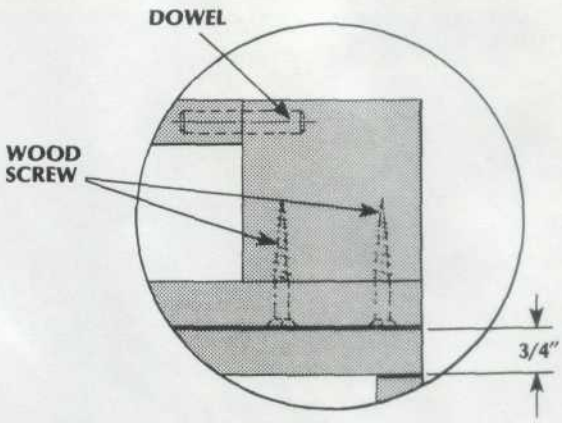
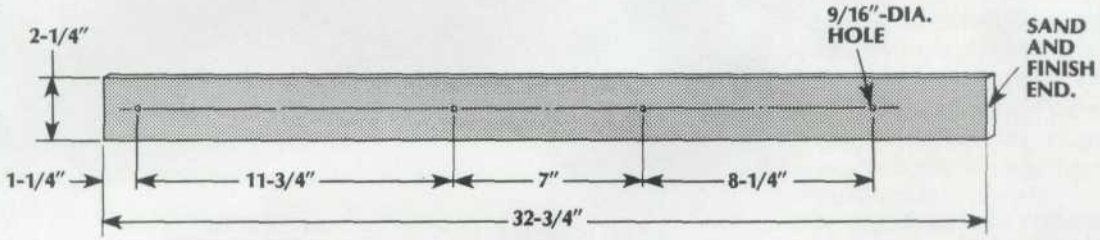


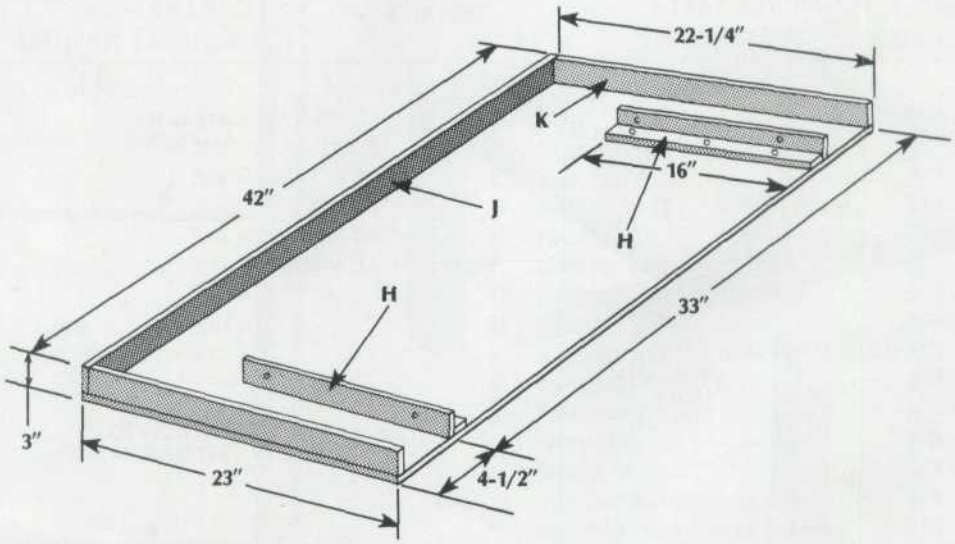
DETAIL A
(WITHOUT EXTENSION)



DETAIL B
(WITH EXTENSION)



EXTENSION
SUPPORT (G)



EXTENSION DETAIL

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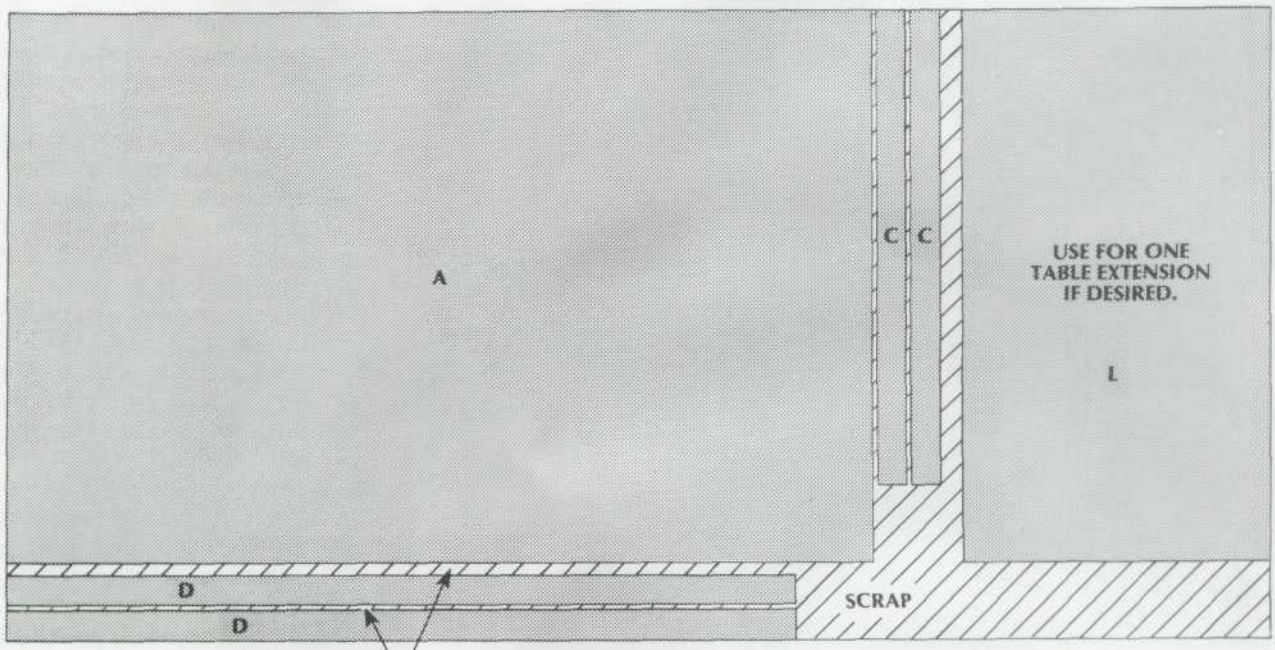

NOTE: AMPLE ALLOWANCE NEEDED FOR SAW KERF.

3/4" × 4' × 8' PLYWOOD CUTTING LAYOUT

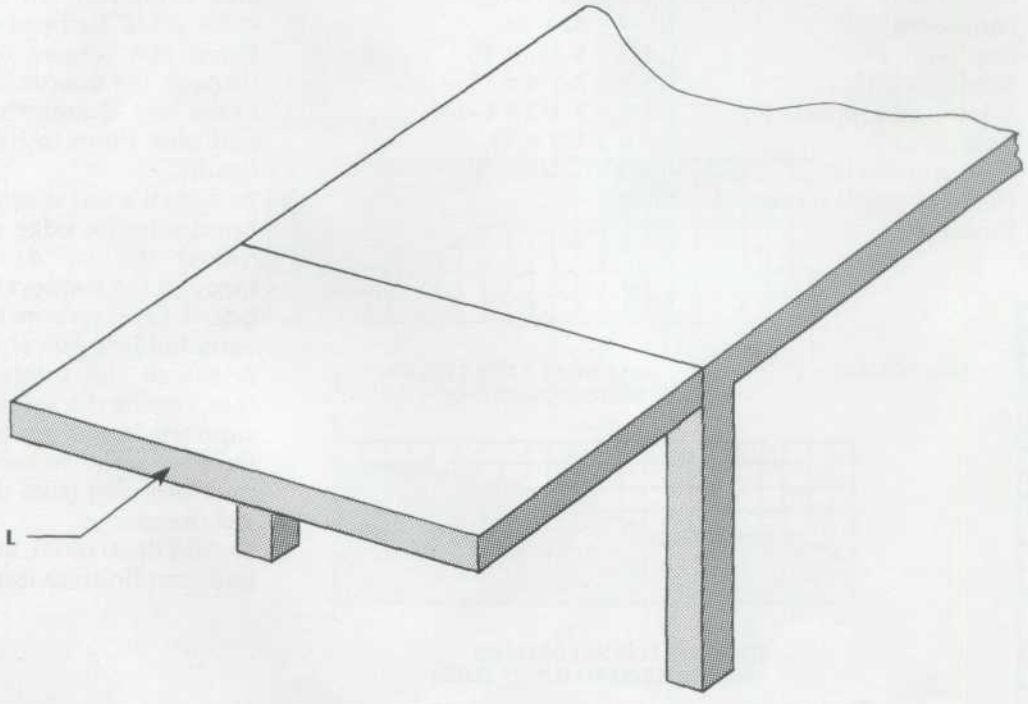

TABLE EXTENSION IN
MOUNTED POSITION

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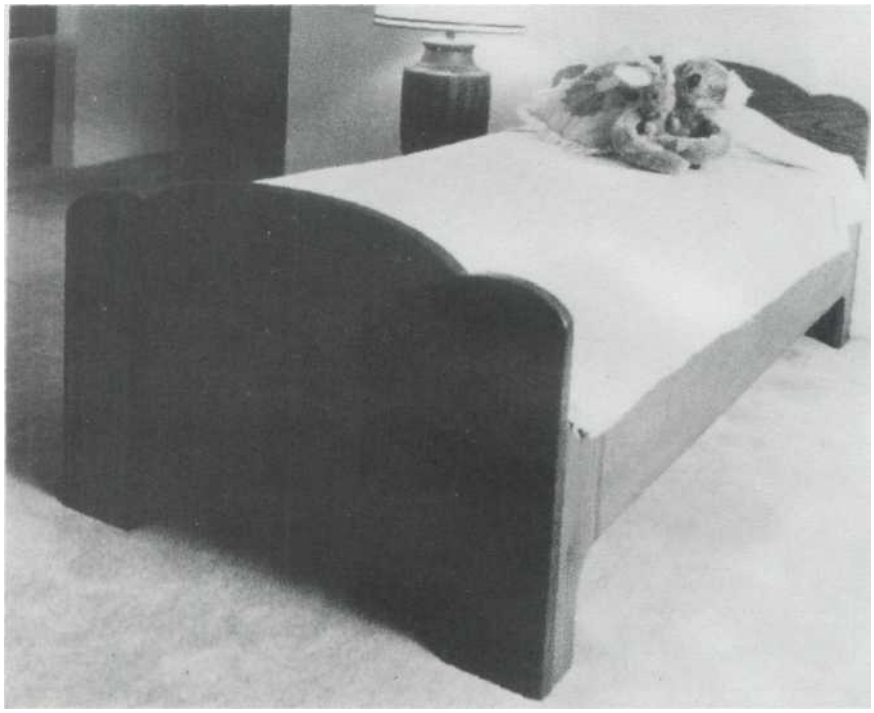
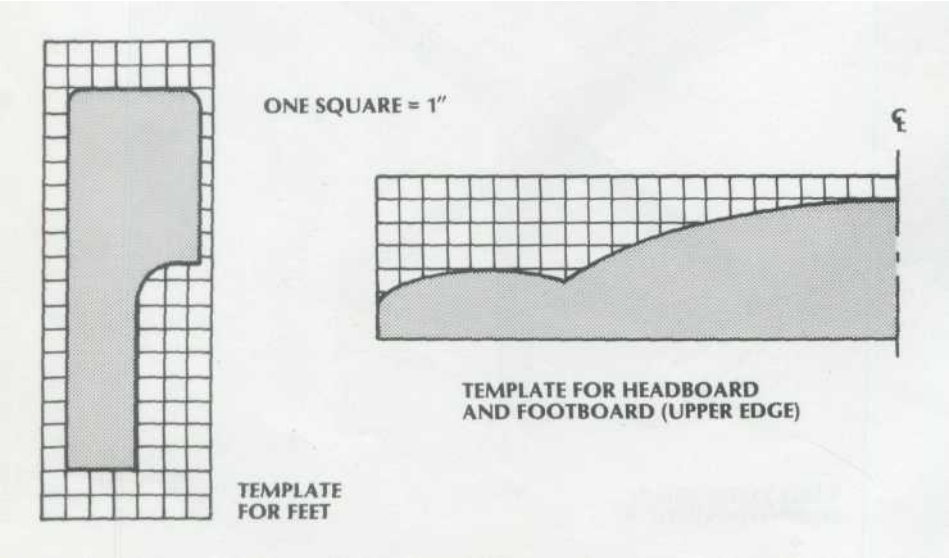
Twin ~~Bed~~



LIST OF MATERIALS

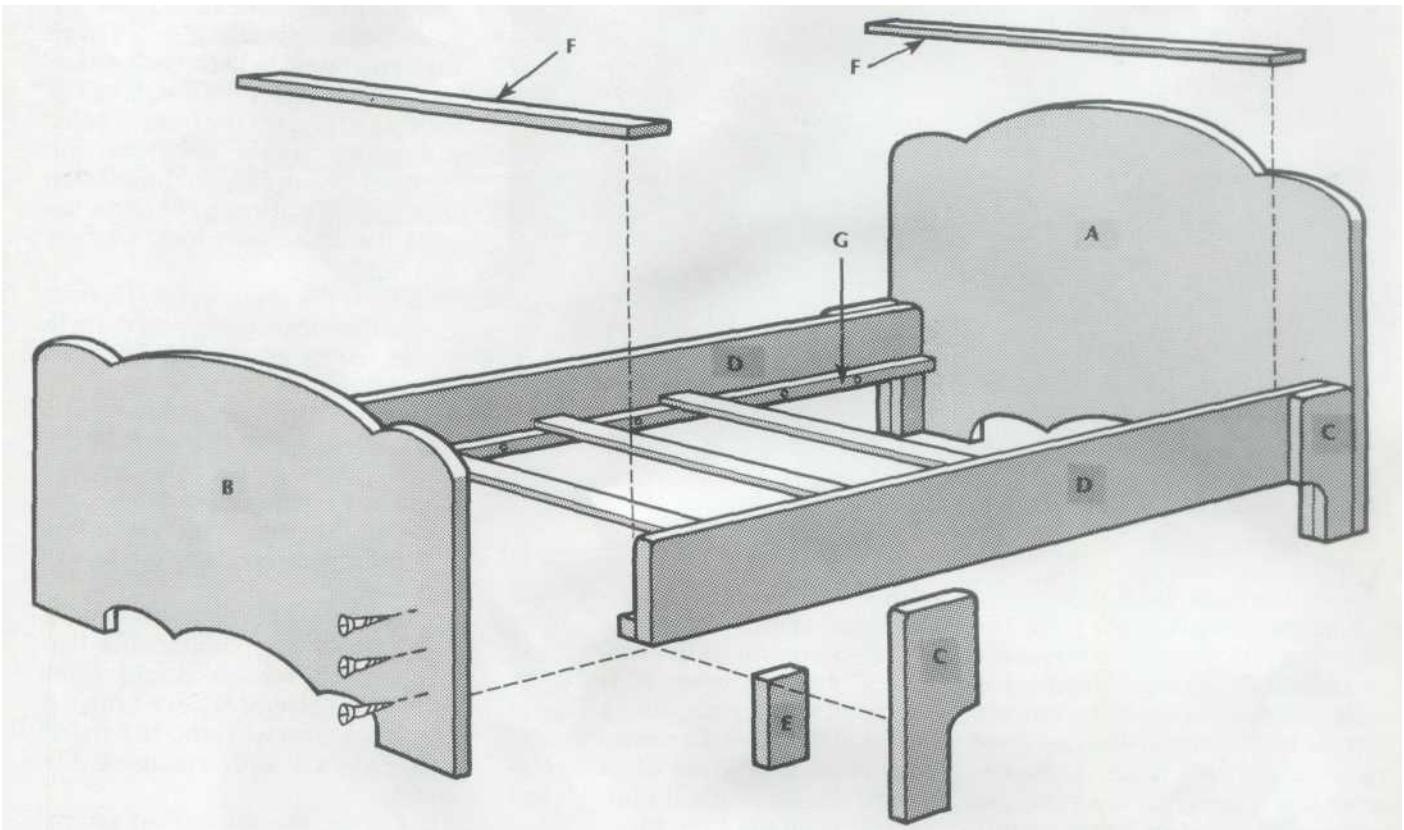
(finished dimensions in inches)

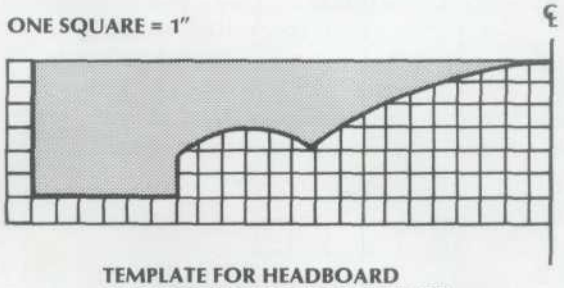
A	Headboard	1-1/2 × 38 × 44
B	Footboard	1-1/2 × 32 × 44
C	Feet (4)	1-1/2 × 5-1/2 × 16
D	Sideboards (2)	1-1/2 × 7-1/4 × 75
E	Sideboard supports (4)	1-1/2 × 3-1/2 × 6-3/4
F	Slats (5)	3/4 × 3-1/2 × 38
G	Slat supports (2)	1-1/2 × 1-1/2 × 75
	Flathead wood screws	#10 × 2-1/2
	Wood glue	



The basic design of this twin bed is very simple and sturdy. While templates are provided for the headboard and footboard, you can create your own pattern if you prefer. In fact, it might be a good idea to select a mattress first and then adjust the dimensions to fit.

1. Make full-size templates for the headboard (A) and footboard (B) using the patterns provided.
2. Glue up a pair of panels for the headboard and footboard from 2 x 6 and/or 2 x 8 stock. When the glue has dried, sand the panels smooth and cut them to the di mensions given.
3. Transfer the template designs to the panels. Cut out the headboard and footboard pieces, then sand their edges smooth.
4. Cut the remaining pieces to size using the dimensions provided.
5. Attach a sideboard support (E) to each foot (C) using flathead wood screws. Make two right-fac ing feet and two left-facing feet.
6. Fasten the feet to the headboard and footboard using glue and #10 x 2-1/2" flathead wood screws. Drive the screws counterbored through the boards into the edges of the feet. Counterbore the holes and plug them to hide the screw heads.
7. Attach a slat support (G) to the bottom inside edge of each side board (D) by driving screws through the support into the side board. Counterbore the screws for extra holding power.
8. Attach the sideboards to the feet, resting the sideboards on the supports inside the feet. Use four flathead wood screws at each cor ner, fastening from the inside. Do not use glue.
9. Add the slats (F), sand the entire bed, and finish as desired.





TEMPLATE FOR HEADBOARD
AND FOOTBOARD (LOWER EDGE)

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Reading Table

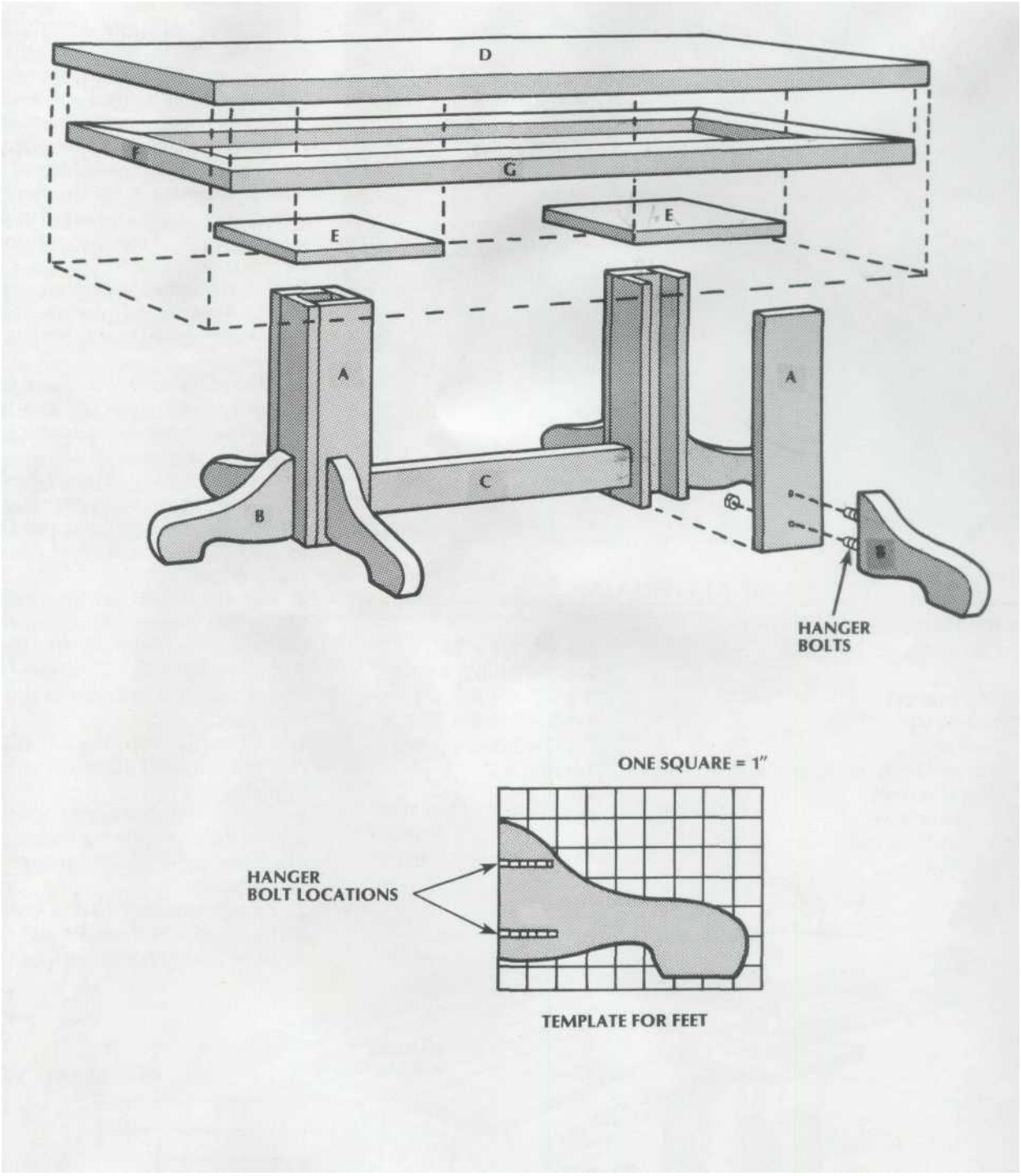
Here is a basic table design that can accommodate many uses. The table shown in the photo was made of redwood and assembled using waterproof glue and galvanized fasteners. Because it was designed to serve as a deck table, it is somewhat low in height. However, you can easily substitute other woods, use standard glue and fasteners, and raise the column height a few inches to create a handsome reading or dining table for the interior of your home.

1. Use the pattern provided to make a template for the feet (B), then lay them out on the lumber. By alternating directions and overlapping the feet, you can cut them out of 2 x 8 stock with minimal waste.
2. Form the top (D) by edge-gluing three pieces of 2 x 8 stock (or more numerous pieces of narrower stock). After the glue dries, sand the panel flat and trim it to the finished dimensions given in the list. Round overall edges with a router.
3. Cut the remaining parts to the dimensions provided.
4. Arrange the column sides (A) with their edges chasing each other, then fasten them into square columns using wood glue and 3d finishing nails. Set the nails just below the surface.
5. On the stretcher face of each column, center and drill a pair of 5/16"-diameter pilot holes, one 2-1/2" and the other 5" from the bottom. Center and drill a pair of holes of the same diameter through the remaining faces of each column; locate these holes 1" and 3-1/2" from the bottom.
6. Center and drill a pair of 7/32"-diameter pilot holes into each end of the stretcher(C) and into the back of each foot, using the same 2-1/2" center-to-center spacing used on the columns. Set the lower holes in the feet 1" above the bottom edge of their backs as indicated in the template pattern. Locate the holes in the stretcher 1" up from the bottom and 1" down from the top edges. Drill these holes as deep as necessary for installing the lag-thread ends of the hanger bolts.
7. Lag the hanger bolts into the feet and the stretcher, then fasten these parts to the two columns. Secure the bolts with lock washers and nuts.
8. Center the top brackets (E) over the column tops and fasten them in place using #8x1-1/2 flathead wood screws.
9. Lay the top upside down on a flat surface. Miter the ends of the apron pieces (F, G), then arrange them in a rectangle on the underside of the top. Make sure the apron is centered along the length and width.
10. Fasten the apron to the top using #10 x 2-1/2" countersunk flathead wood screws. Avoid using glue in this assembly since both the top and apron will tend to expand and contract with changing humidity.
11. Center the apron/top assembly over the leg/column assembly. Fasten them together by driving #8 x 1-1/2" flathead wood screws through the brackets into the top. (You will find this easier to do with the entire assembly turned upside down.)
12. Sand the table and finish according to taste.

LIST OF MATERIALS

(finished dimensions in inches)

A	Column sides (8)	3/4 × 3-1/2 × 14
B	Feet (6)	1-1/2 × 5-1/2 × 8-1/2
C	Stretcher	1-1/2 × 3-1/2 × 19
D	Top	1-1/2 × 21-1/2 × 44
E	Top brackets (2)	3/4 × 7-1/4 × 7-1/4
F	End aprons (2)	1-1/2 × 3-1/2 × 18-1/2
G	Side aprons (2)	1-1/2 × 3-1/2 × 41
	Hanger bolts (with nuts and lock washers)	1/4 dia. × 2-1/2
	Wood screws	#8 × 1-1/2
	Wood screws	#10 × 2-1/2
	3d finishing nails	
	Wood glue	



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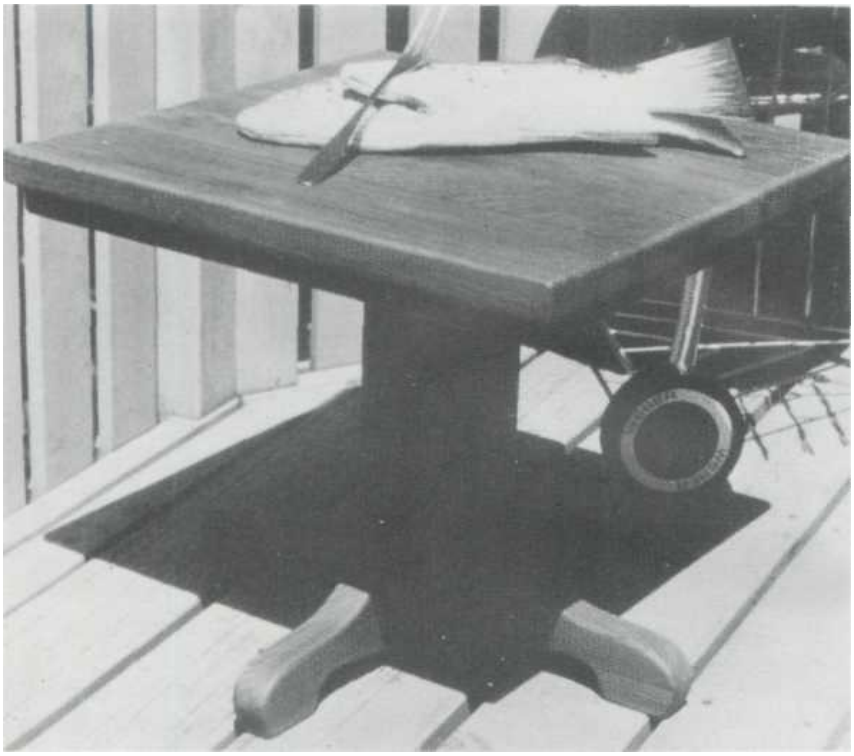
End Table



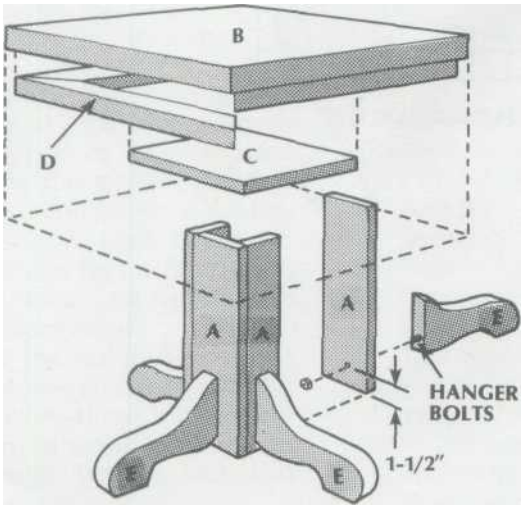
This table will add beauty and convenience to any setting, indoors or out. The one shown here was made of redwood and assembled with waterproof fasteners. However, you can use the wood of your choice with conventional fasteners to create a lovely piece of indoor furniture. Adjust the column height and top dimensions to suit your tastes.

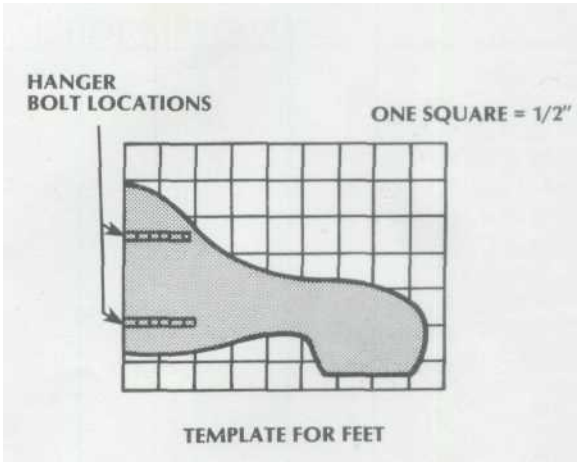
1. Cut the pieces to size according to the dimensions provided. Use the pattern to make a template for the feet (E).
2. Glue and screw or nail one edge of the column sides (A) at a time until the column is complete. Check for squareness.
3. Glue up the top (B) from 2 x 8 or narrower stock. After the glue dries, sand the panel flat and cut it to 21-1/2" square. Round over all sharp edges.
4. Cut 45° miters on the ends of the apron pieces (D). Center the pieces on trie underside of the top, and drive #10 x 2-1/2" screws from underneath the apron into the top to secure.
5. Center the top bracket (C) on the column, and glue and screw it in place.
6. Center the top/apron assembly on the column, gluing and screw ing from underneath through the top bracket.
7. Attach the feet to the column using hanger bolts and nuts.
8. Sand and finish as desired.

LIST OF MATERIALS

(finished dimensions in inches)

A	Column sides (4)	3/4 × 3-1/2 × 16
B	Top	1-1/2 × 21-1/2 × 21-1/2
C	Top bracket	3/4 × 7-1/4 × 7-1/4
D	Apron (4)	1-1/2 × 3-1/2 × 20-1/4
E	Feet (4)	1-1/2 × 5-1/2 × 8-1/2
	Hanger bolts, nuts, and lock washers	1/4 dia. × 2-1/2
	Wood screws	#10 × 2-1/2
	Wood screws	#8 × 1-1/2
	3d finishing nails	
	Wood glue	





Drop Table

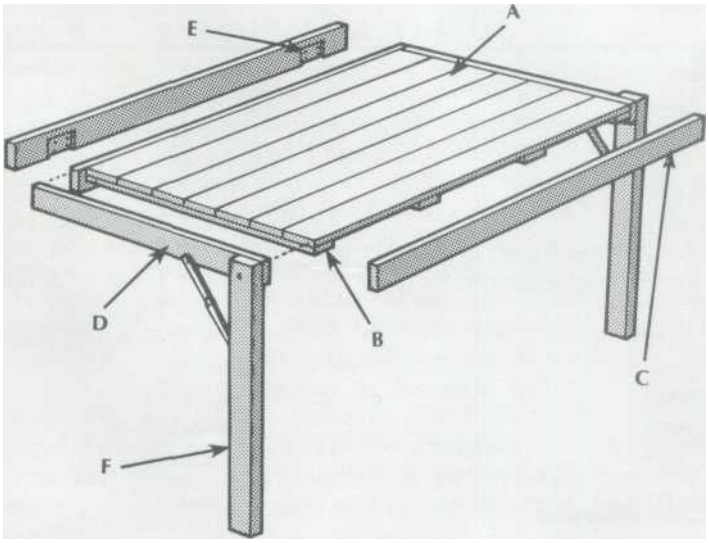
This multi-purpose table drops flush to the wall when not in use. The hinged legs fold out of sight when the table is down, and you can even mount it on a wall to use it as a serving table.

1. Cut the pieces to size according to the dimensions given.
2. Nail the top pieces (A) to the top supports (B), then add the sides (C) and ends (D).
3. Attach the legs (F) with carriage bolts. Use a washer between the leg and the table at the pivot point so the leg can swing up properly for storage.
4. Mount hinges to the table and hinge piece (E). Attach the hinge piece to the wall at the proper leg height as shown.
5. Finish the table according to in dividual preference.

LIST OF MATERIALS

(finished dimensions in inches)

A	Top pieces (7)	3/4 × 3-1/2 × 46-1/2
B	Top supports (4)	3/4 × 3-1/2 × 24-1/2
C	Sides (2)	3/4 × 3-1/2 × 48
D	Ends (2)	3/4 × 3-1/2 × 24-1/2
E	Hinge piece	3/4 × 3-1/2 × 48
F	Legs (2)	3/4 × 3-1/2 × 30
	Carriage bolts and washers	1/4 dia. × 3-1/4
	3d finishing nails	
	Collapsible leg supports	



WORKBENCH

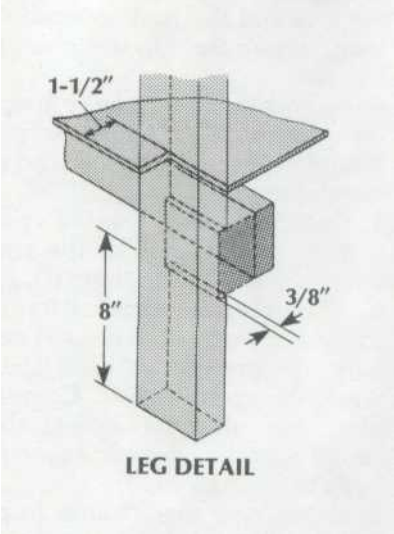
Any home handyman knows the value of a workbench. This one provides plenty of work space, a large shelf, and a perforated peg-board backing for hanging tools. The tabletop is made of 3/4" waf-erboard covered with 1/4" hard-board. The workbench shown here is 8' long, but you can make it any length to fit your work space.

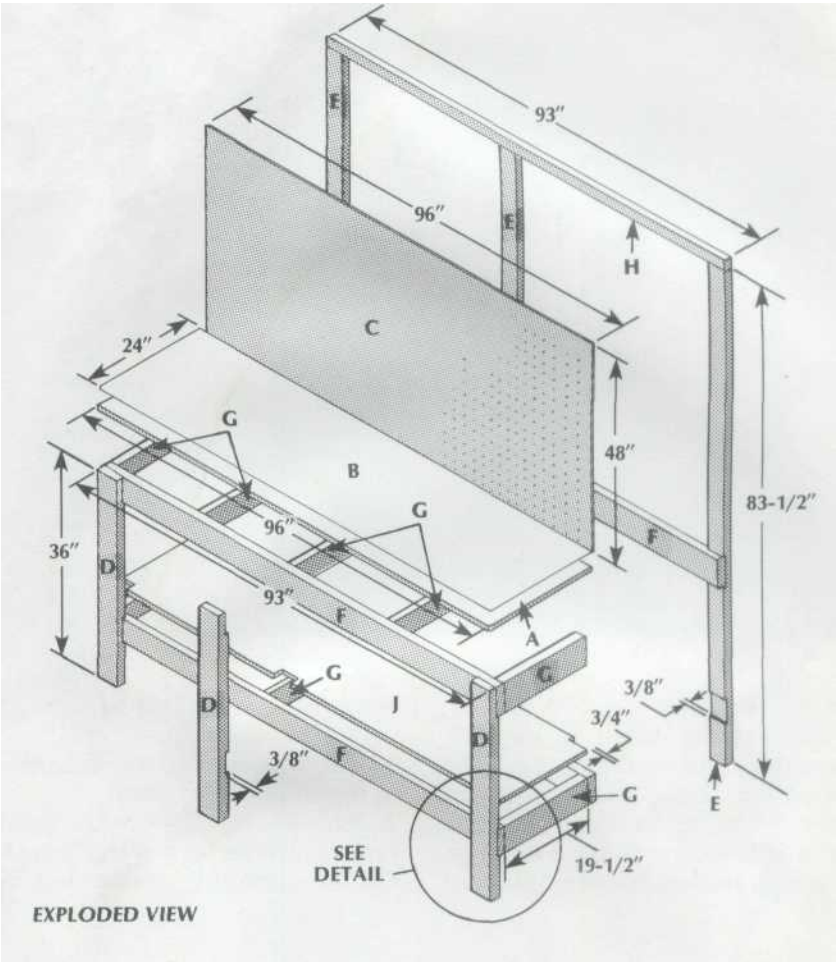
1. Cut all pieces to size according to the dimensions given.
2. Assemble the support frames (F) for the tabletop (B) and the shelf (J) by fastening the fronts and backs to the crosspieces (G) using 12d nails. In both cases, position one cross-piece at each end and one across the middle. Add two more cross-pieces to the top frame to help stiffen the tabletop work surface.
3. Cut a 3-1/2"-wide x 3/8"-deep rabbet across the top of each front leg (D) for fitting the top frame on the legs. Then cut dadoes of the same dimensions at a parallel loca tion across each of the back legs (E). Also, cut parallel dadoes across each leg about 8" above the bot tom for fitting the shelf frame be tween the legs.
4. Fasten the legs to the frames us ing #8x2-1/2" flathead wood screws countersunk flush with the leg surface. Use at least two screws per joint and offset them for in creased frame stability.

LIST OF MATERIALS

(finished dimensions in inches)

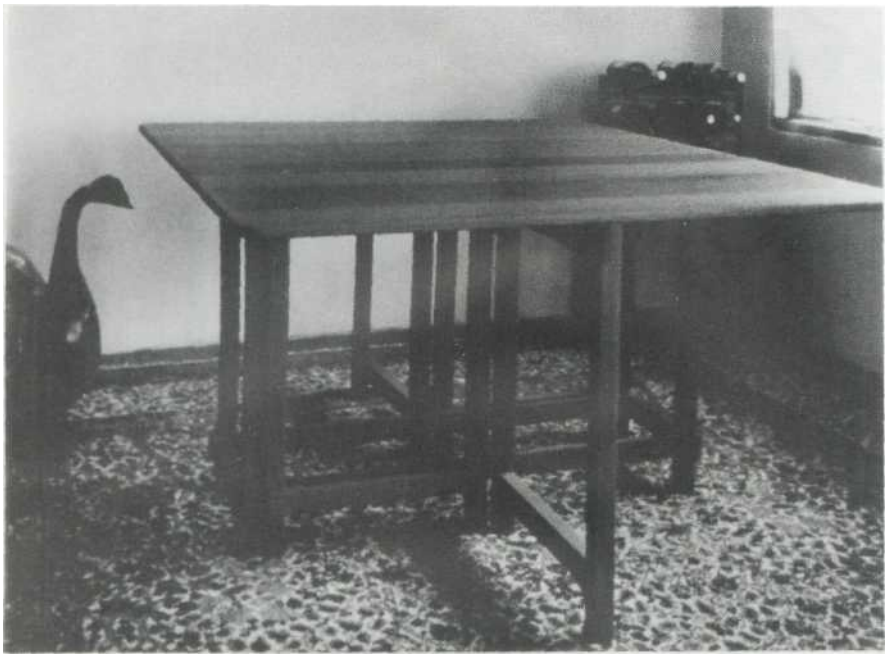
A	Tabletop base	3/4 × 24 × 96 waferboard
B	Tabletop	1/4 × 24 × 96 hardboard
C	Backing	1/4 × 48 × 96 perforated hardboard
D	Front legs (3)	1-1/2 × 3-1/2 × 36
E	Back legs (3)	1-1/2 × 3-1/2 × 83-1/2
F	Top and shelf frame fronts and backs (4)	1-1/2 × 3-1/2 × 93
G	Top and shelf frame crosspieces (8)	1-1/2 × 3-1/2 × 19-1/2
H	Crossbar	1-1/2 × 1-1/2 × 93
J	Shelf	3/4 × 23-7/8 × 93 waferboard
	Wood screws	#6 × 7/8
	Wood screws	#8 × 1-1/2
	Wood screws	#8 × 2-1/2
	Angle irons	1-1/2 or 2
	12d nails	
	Construction adhesive	





5. Cut 3-1/2"-wide x 1-1/2"-deep notches in the front edge of the shelf, one at each end and one in the middle, in order to fit the shelf around the front legs. Cut parallel notches of the same width, but 3/4" in depth, on the back edge of the shelf for fitting around the back legs.
6. Insert the shelf between the legs and fasten it to the support frame using #8 x 1-1/2" flathead wood screws, countersunk flush or driv en slightly below the shelf surface. If you like, run a bead of construc tion adhesive along the upper edge of the frame before installing the shelf.
7. Set the tabletop base (A) on the top frame. Push the top against the back legs and center it along the length of the support frame.
8. Clamp or tack the top in place while drilling countersunk pilot holes for #8 screws through it into the frame. Space the holes about 12" apart. If you want to use con struction adhesive, remove the top and spread a bead of adhesive on the top of the frame. Then reposi tion the top and fasten it in place using #8 x 1-1/2" flathead wood screws. Drive all the screws slightly below the surface of the tabletop.
9. Position the tabletop over the base, making all edges flush. Then fasten the top to the base using #6 x 7/8" flathead wood screws, driven slightly below the outer sur face. This installation method will allow for periodic replacement of the tabletop. For permanent instal- lation, apply construction adhesive to the base, position the tabletop over it, and press it flat, then tack it in place.
10. Place the bench in the desired location and shim the legs as needed to make the top complete ly level and to stabilize the bench. Then use angle irons to fasten the legs to the floor, or run fasteners through the back legs into the wall, or do both.
11. Set the backing (C) on the table top. Center it along the length of the bench, then fasten it to the upper section of the back legs and to the crossbar (H) using #6 x 7/8" flathead wood screws.

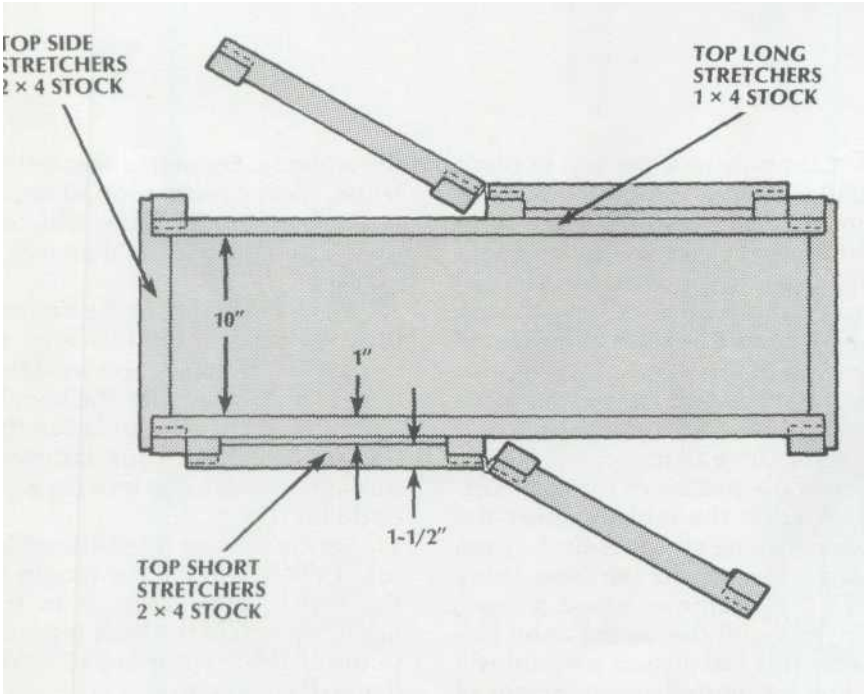
Gateleg Table

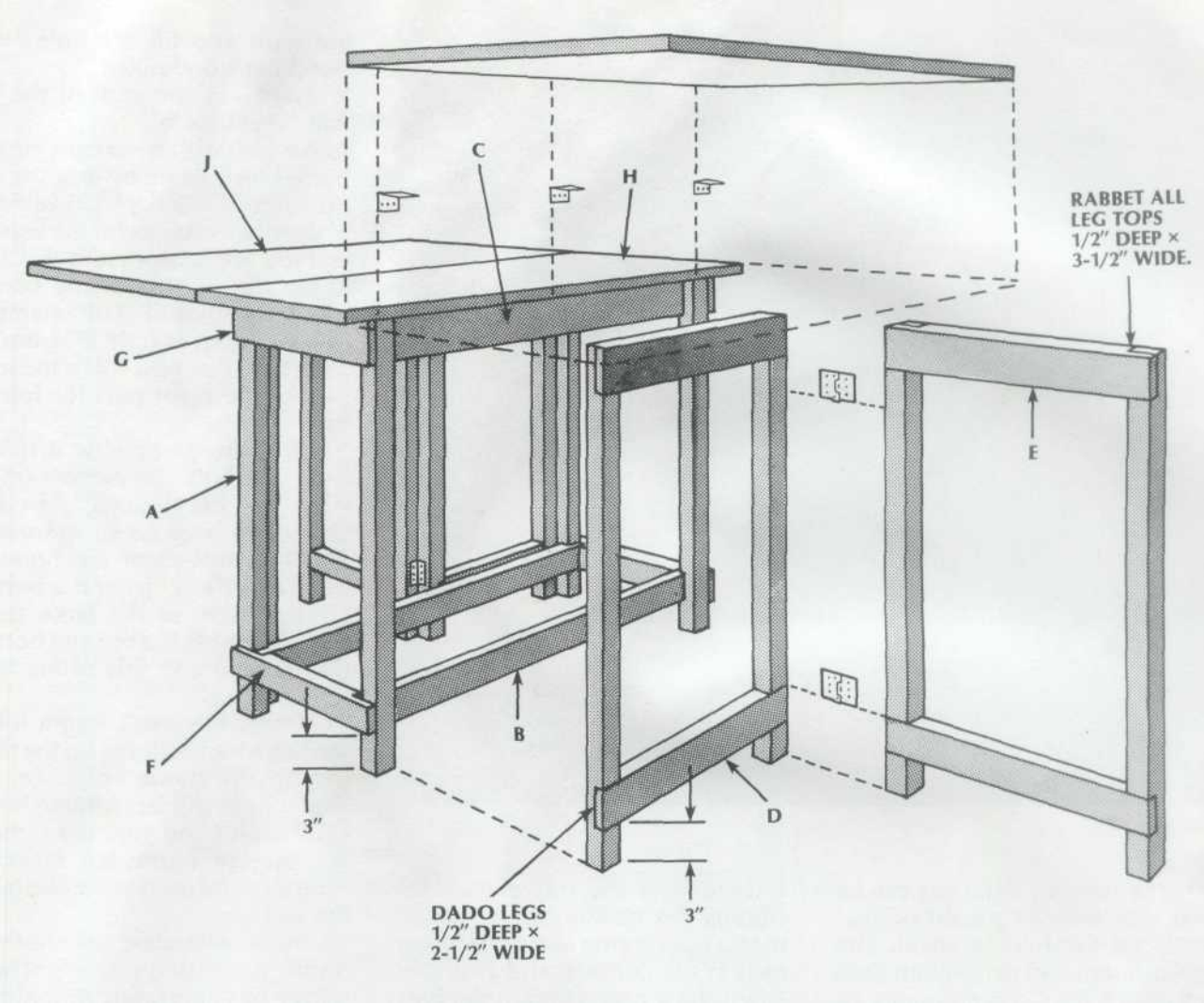


This gateleg table is elegant enough for indoor dining, yet light enough to be carried outdoors when the occasion arises. It opens up to a surface area large enough to accommodate four people and is the perfect project to show off your craftsmanship.

1. Cut the pieces to size according to the dimensions given.
2. Cut 1/2"-deep x 3-1/2"-wide rabbets on the tops of the legs (A). On the same side of each leg, cut 1/2"-deep x 2-1/2"-wide dadoes 3" up from the bottom.
3. Round and sand the edges of the legs and the back sides of the long bottom and top stretchers (B, C).
4. Assemble the two large frames using glue and wood screws. Round over the edges and sand the faces of the frames.
5. Cut 3/4"-deep x 1-1/2"-wide rabbets in the ends of the short bottom and top stretchers (D, E).
6. Assemble the four small frames, using glue and two screws at each joint. The stretchers should lap the legs and protrude 1/4". Counter-bore and plug the holes; then round over the edges and sand the faces of the frames.
7. Fasten one small frame to the left side of each large frame. The leg on the small frame should sit against the leg on the large frame as shown. To do this, drive two screws from the back through the stretcher into the top and bottom of each leg.
8. Cut 3/4"-deep x i-i/2"-wide laps in the ends of the bottom and top side stretchers (F, G). Sand the stretchers; then attach them to the frames using glue and screws. Plug the screw holes.
9. Attach the two remaining small frames to the base using butt hinges. This completes the base of the table.
10. Glue up stock for the top and leaf pieces (H, J). The top will over hang the base 1-1/4" on each side to accommodate the hinges.
11. Mount the top to the base by screwing and plugging through the top into the stretchers.
12 Use three hinges to attach each
leaf to the top, making sure that the center hinge is in front of the stationary frame so it will not inter fere with the movement of the gate leg.

13 Sand the entire table and finish as desired.





LIST OF MATERIALS

(finished dimensions in inches)

A	Legs (12)	1-1/2 × 1-1/2 × 28-1/2
B	Bottom long stretchers (2)	3/4 × 2-1/2 × 38-1/4
C	Top long stretchers (2)	3/4 × 3-1/2 × 38-1/4
D	Bottom short stretchers (4)	1-1/2 × 2-1/2 × 17-1/2
E	Top short stretchers (4)	1-1/2 × 3-1/2 × 17-1/2
F	Bottom side stretchers (2)	1-1/2 × 2-1/2 × 13
G	Top side stretchers (2)	1-1/2 × 3-1/2 × 13
H	Top	3/4 × 17-1/2 × 47-1/2
J	Leaves (2)	3/4 × 18-1/2 × 47-1/2
	Wood screws	#8 × 1
	Tabletop fasteners	
	Brass butt hinges (7)	1-1/2 × 2
	Wood plugs	
	Wood glue	

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Folding Tray

This generously sized tray can be used separately or placed permanently on the folding stand. The classic design and rich walnut goes well with either contemporary or country furnishings.

1. Cut all stock to size according to the dimensions provided.
2. Glue up random width stock to make the tray bottom (C) slightly oversized. When the glue has dried, sand on both sides and trim the bottom to final size.
3. Miter the corners for connecting the back (A) and the tray sides (B).Cut1/4"-wide x 1/2"-deep rabbets on the lower inside edges of the back and sides. Taper the inner face on each piece down to 3/8" thickness, beginning the taper at the top of the rabbet as shown.
4. Drill and cut out the handholes on the tray sides as shown.
5. Final sand the tray pieces, including the handholes. Assemble the tray using glue and 4d finishing nails at the corners, and glue and 2d finishing nails through the bottom into the sides. Predrill all nail holes for easier construction; set the nails and fill the holes with matching wood putty.
6. Angle-cut the ends of the top rails (E) as shown.
7. Assemble the narrow inside frames first. Begin by locating and drilling 1/4"-diameter dowel holes 1" deep at the joints for the legs (D) and top and bottom rails (E, G).
8. On the outside of the narrow frame legs, drill 1/4"-diameter holes 1" deep exactly 17" from the bottom of the legs. This is the location of the pivot pins for folding the stand.
9. Glue the pivot pins in place, then assemble the narrow frame. Glue the dowel joints and clamp until dry. Check for squareness.
10. Drill 1/4"-diameter holes 1" deep exactly 17" from the bottom of the inside of the large frame legs. Assemble the top and bottom (F) rails and one side of the large frame.
11. Insert the small frame inside the large frame, lining up the pivot pins in the frame holes. Do not glue pins in the large frame legs.
12. Position and glue the remaining outside frame leg in place. Sand all stand parts at the joints and the surface.
13. Finish with clear polyurethane finish. When dry, you might want to tack or staple fabric strapping to the underside of the top rails so the frame opens up to 24" in width.

LIST OF MATERIALS

(finished dimensions in inches)

A	Back	3/4 × 5 × 30
B	Tray sides (2)	3/4 × 5 × 16-1/4
C	Tray bottom	1/2 × 16 × 29
D	Legs (4)	3/4 × 1-3/4 × 34-1/4
E	Top rails (2)	3/4 × 1-3/4 × 16
F	Bottom rail	3/4 × 1-3/4 × 10-1/2
G	Bottom rail	3/4 × 1-3/4 × 7
	Grooved dowel pivot pins	1/4 dia. × 2
	Fabric strapping	1-1/2 × 2 × 32
	2d finishing nails	
	4d finishing nails	
	Wood putty	
	Wood glue	

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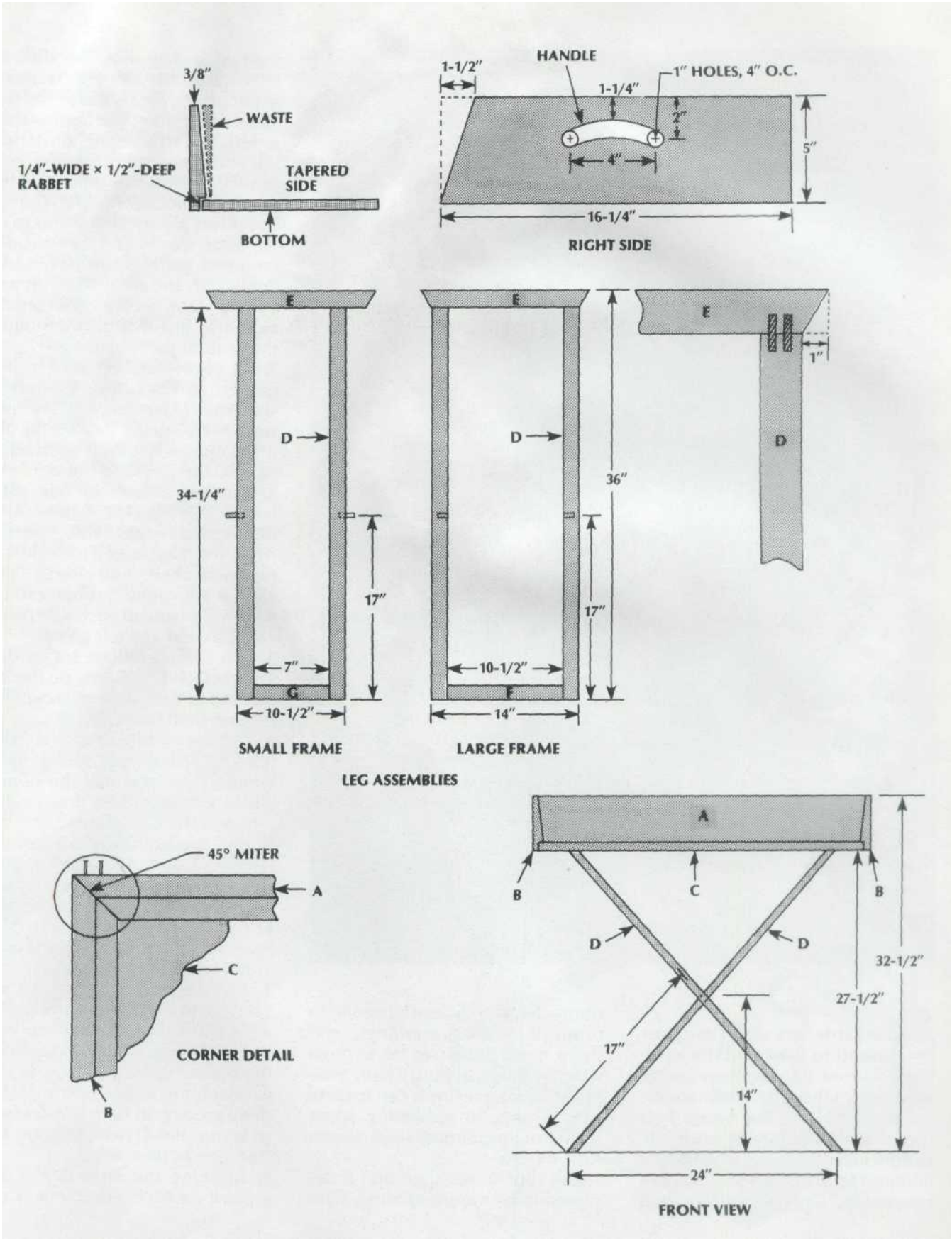

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PLANT SHELF

Smart gardeners don't wait for the ground to thaw and the air to warm before starting their spring gardening. The first seeds are always sown inside the house in a spot that gets plenty of sunshine. Unfortunately, space is usually a limiting factor in most seed starting operations. Only a few windows normally get sufficient sunshine to produce healthy seedlings, and there never seems to be enough window ledge to satisfy your aspirations. However, you can expand your preseason gardening space with the suspended seed starter shown here.

This four-tiered shelf unit is designed to be mounted into a standard window frame. The shelves, which are removable to facilitate larger plants, are supported by two metal side frames. The bottom shelf is designed to rest on the window sill; consequently, this and all other shelf dimensions must be sized to your particular window. The unit receives plenty of light, takes up no floor space, and can be dismounted easily when not in use. Tools, soil, and miscellaneous gardening materials are conveniently stored in the two drawers under the bottom shelf.

1. To begin building your indoor garden, start by cutting the bottom shelf back (A) to length. Cut a 1/2"-wide x 3/8"-deep groove in the back, one inch from the top edge, to hold the plywood bottom.
2. Cut the bottom shelf sides (B) to length. Cut a 1/2"-wide x 3/8"-deep groove in each side, one inch from the top edge, to hold the plywood shelf. Machine a 3/4"-wide x 3/8"-deep rabbet on the back inside end of each side piece. Make a right and left piece.
3. Cut a blind rabbet 3/4" wide x 3/8" deep x 1-1/2" long on the un cut end of each side to accept the bottom shelf front (D).
4. Cut the middle drawer support (C) and the drawer glides (E) to length. Glue and nail the drawer glides to the middle drawer sup port and the side pieces.
5. Cut the bottom shelf front to length. Cut a 1/2"-high x 3/8"-deep rabbet in the bottom inside edge to accept the plywood shelf.
6. Cut the bottom shelf (F) to size. Assemble the shelf unit parts using glue and 5d finishing nails.
7. Cut the drawer fronts (G) and sides (H) to length. Machine a 3/4"-wide x 3/8"-deep rabbet on each end of the drawer fronts to accept the drawer sides.
8. Machine a 1/4"-wide x 3/8"-deep groove on each drawer front to accept the drawer bottom, 1/4" from the bottom edge.
9. Machine the same 1/4" x 3/8" groove on each side piece. Cut a

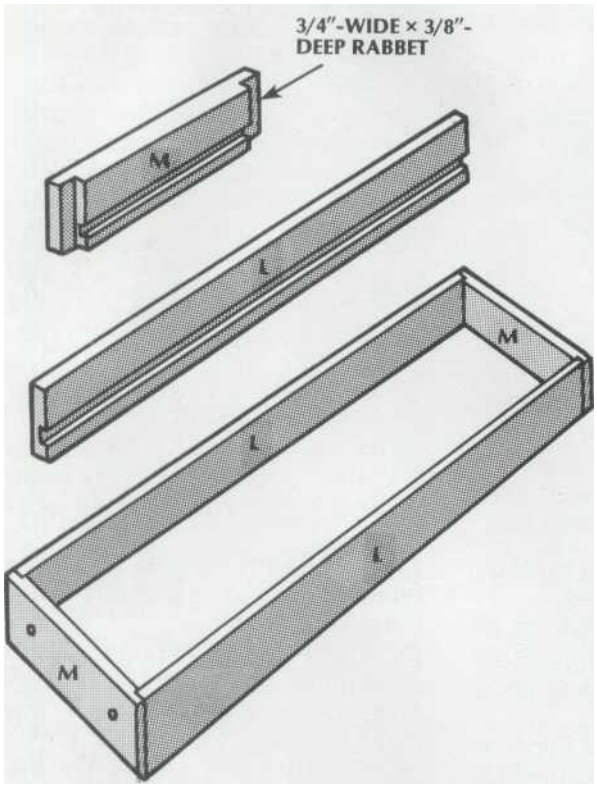
LIST OF MATERIALS

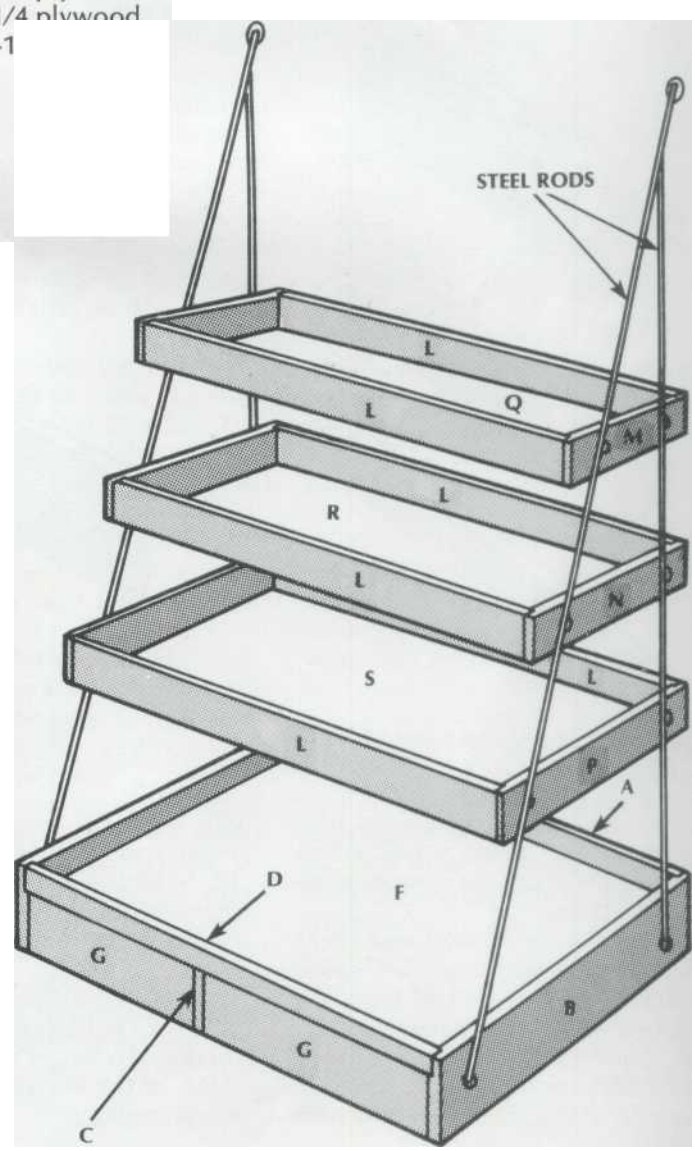
(finished dimensions in inches)

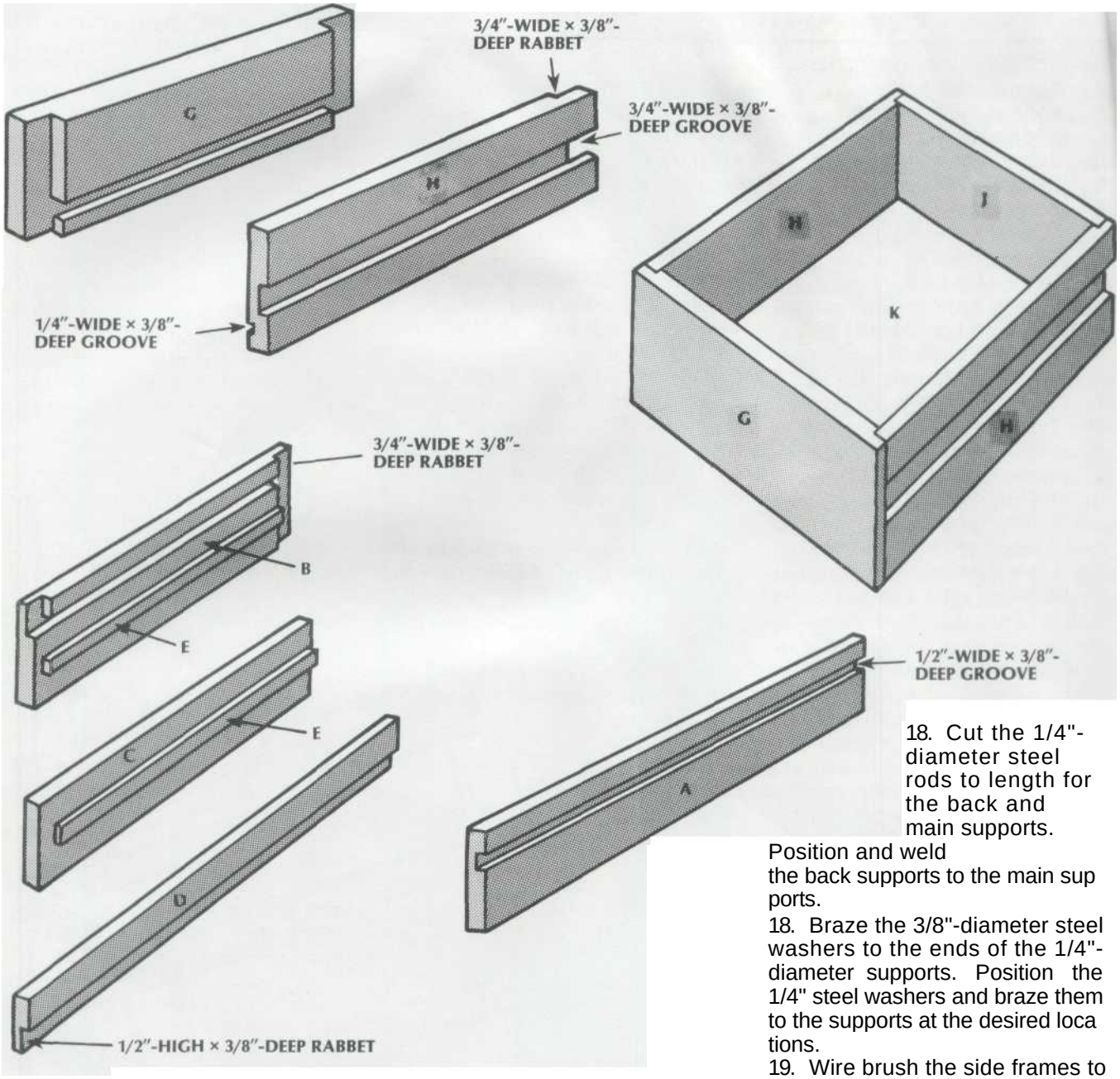
A	Bottom shelf back	3/4 × 5-1/2 × 35-1/4
B	Bottom shelf sides (2)	3/4 × 5-1/2 × 18
C	Middle drawer support	3/4 × 4 × 17-1/4
D	Bottom shelf front	3/4 × 1-1/2 × 35-1/4
E	Drawer glides (4)	3/8 × 3/4 × 16-7/8
F	Bottom shelf	1/2 × 17-1/4 × 35-1/4 plywood
G	Drawer fronts (2)	3/4 × 4 × 16-7/8
H	Drawer sides (4)	3/4 × 4 × 16-7/8
J	Drawer backs (2)	3/4 × 3-1/2 × 16-1/8
K	Drawer bottoms (2)	1/4 × 16-1/8 × 16-7/8 plywood
L	Shelf fronts and backs (6)	3/4 × 1-1/2 × 35-1/4
M	Top shelf ends (2)	3/4 × 1-1/2 × 7
N	Middle shelf ends (2)	3/4 × 1-1/2 × 10-1/2
P	Lower shelf ends (2)	3/4 × 1-1/2 × 14
Q	Top shelf	1/4 × 6-1/4 × 35-1/4 plywood
R	Middle shelf	1/4 × 9-3/4 × 35-1/4 plywood
S	Lower shelf	1/4 × 13-1/4 × 35-1
	1/4"-dia. steel rod	
	Finishing nails	
	Roundhead wood screws	
	Clear silicone caulk	
	Wood glue	

3/4"-wide x 3/8"-deep groove on the outside face of each drawer side for the drawer glides.

10. Machine a 3/4"-wide x 3/8"-deep rabbet on the end of each side piece to accept the back panel.
11. Cut the drawer backs (j) and drawer bottoms (K) to size.
12. Assemble the drawer sides, front, back, and bottom with glue and nails. Note that the back must be installed flush at the top; also, the bottom cannot be glued; it must always be nailed.
13. Cut the top, middle, and lower shelf ends (M, N, P) to length. Ma chine a 3/4"-wide x 3/8"-deep rab-







bet on each end of the pieces. Machine a 1/4"-wide x 3/8"-deep groove 1/4" from the bottom edge of each piece.

14. Cut the shelf fronts and backs (L) to length. Machine a 1/4"-wide x 3/8"-deep groove 1/4" from the bottom edge of each piece.

14. Cut the top, middle,and lower
shelf bottoms (Q, R, S) to size. As semble all the shelf elements with glue and nails, except the bottom, which should not be glued.

16. Machine a 1/4" radius on all sharp edges of the shelf frames, or round them over with a sanding block.

16. Sand all surfaces and finish as desired; polyurethane varnish is recommended. Caulk the inside joints of the shelves with clear silicone caulking.

18. Cut the 1/4"-diameter steel rods to length for the back and main supports. Position and weld
the back supports to the main sup ports.

18. Braze the 3/8"-diameter steel washers to the ends of the 1/4"-diameter supports. Position the 1/4" steel washers and braze them to the supports at the desired loca tions.

19. Wire brush the side frames to remove loose scale and dirt. Paint the side frames.

20. Attach the side frames to the shelf units. Use #12 x 3/4" round head wood screws for the top three shelves and #12x1-1/4" roundhead wood screws for the shelf with drawers.

21. Mount the unit to the window with #14 x 2-1/2" wood screws.